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ABSTRACT

This instructor's guide contains the materials required to teach a competency-based introductory course in interior systems to students who have chosen to explore careers in construction. It contains three units: interior systems materials, interior systems tools, and applied skills. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, student supplements, transparency masters, instructional supplements, assignment sheets, job sheets, practical tests, and answers to assignment sheets and written tests. Academic skills training is combined with vocational training throughout the instructional materials, and a system of icons has been used to help instructors identify activities into which training in the following basic skill areas has been infused: reading, science, creative thinking/problem solving, writing, oral communication, employability, math, interpersonal skills, and social studies. Most units of instruction are designed for use in more than one lesson or class period of instruction. A basic skills matrix and competency profile are provided. These materials precede the instructional units: information on basic skills in curriculum, information on measuring student performance gains, and required criteria for a competency-based education program. A basic skills documentation matrix and competency profile are provided at the end of the manual. (YLB)

ED 385 690

introduction to construction series

introduction to interior systems

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instructor edition

CE 069 585

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Introduction to Interior Systems

Developed as a Cooperative Project by
the Associated General Contractors of America
Steve L. Hoech, Chairman, Manpower and Training Committee
and
Curriculum and Instructional Materials Center,
Oklahoma Department of Vocational and Technical Education

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INTRODUCTION TO INTERIOR SYSTEMS

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FOREWORD

In 1985, The Associated General Contractors of America (AGC) met with representatives of the Oklahoma Curriculum and Instructional Materials Center (CIMC) to discuss the possibilities of developing, as a cooperative project a course of instruction designed for training individuals who choose to seriously explore careers in construction.

This publication is the result of those original discussions and those made through close coordination among general contractors and vocational educators. This series represents conscious effort to coordinate the practical experience of personnel in the carpentry industry with the best instructional methods of those in the field of vocational education.

Although this book reflects a systematic approach to instructional materials development and the latest in educational technology innovations, the information in the *Introduction to Interior Systems* manual should be adapted and modified to coincide with local conditions.

Roy Peters, Jr.
State Director
Oklahoma Department of Vocational
and Technical Education

Steve L. Hoech, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

PREFACE

Construction requires that students have many skills and related information to become productive workers in this challenging field. Workers must be better trained and equipped to find and retain meaningful employment.

Instructional materials in this manual is written in terms of student performance, using measurable behavioral learning process. Criterion-referenced evaluation instrument provide for a uniform measurement of student progress.

The purpose of this manual is to assist instructors in all construction related areas in providing instruction throughout the industry. Any information in this manual that does not concur with the instructor's course-of study should be modified to meet personal needs.

Personnel safety is of prime concern, as an instructor you are encouraged to closely observe and couch students in all safety issues. We have done much to advise students of possible dangers, but your close supervision and alertness can't be overemphasized.

Al Willey
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational
and Technical Education

ACKNOWLEDGEMENTS

Much appreciation is expressed to the many individuals who contributed their time, talents, and knowledge in the revision of this manual.

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USE OF THIS PUBLICATION
INSTRUCTIONAL UNIT

Introduction to Interior Systems contains three units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the instructor, extensions and options, information sheets, students supplements, transparency masters, instructional supplements, assignment sheets, job sheets, practical tests, written test, and answers to assignment sheets and written test, all of which are included in the instructor's edition. The student workbook includes the objective sheets, information sheets, student supplements, transparency masters, assignment sheets, and job sheets. Written tests may be duplicated for classroom use or *additional copies* may be purchased by calling 1-800-654-4502 or, in Oklahoma, 1-800-522-5810, ext. 589.

All of the unit components tie into measurable and observable learning outcomes. Instructors are encouraged to supplement these components with other resources in order to make them as responsive to local conditions and individual needs as possible.

Most units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
    - — Supplies and equipment needed
    - — Amount of class time needed for demonstrations
    - — Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms. The unit objectives states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective could be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items.

Suggested Activities — Instructor's Edition only

The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities prior to introducing the unit to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Extensions and Options — Instructor's Edition only

Extensions and Options are supplemental material that is not testable or graded and is nice-to-know. Extensions and Options provide the instructor with additional activities, fact sheets, art, controversial items, and extra practice sheets. They may also include items for the gifted or remedial student. Extensions and Options are used at the discretion of the instructor.

Information Sheets

The information sheet provides "must know" content essential for meeting the cognitive objectives stated at the beginning of each unit. It serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective.

Students should read the information sheet before it is discussed in class. Space is provided in margins for students and instructors to add notes that clarify and/or expand on the information provided.

The information sheet may include notes, cautions, or warnings. These should be discussed carefully and thoroughly. **Notes** are short verbal additions to the information sheet or procedural outline that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. **Cautions** are advisories that tell the student how to avoid causing minor personal injury or equipment damage. **Warnings** are advisories to the student used to avoid serious personal injury or death to the student, persons in the workplace, or users of the project or the procedure.

Student Supplement

Student supplements include instructions that could be used for solving problems or reinforcing the enrichment of learning. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment or job sheets. While supplements are not tested over directly, they may be used to assist in meeting the performance objectives.

Transparency Masters — Instructor's Edition only

Transparency masters provide information in a special way. The students may see as well as hear the materials being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Instructional Supplements — Instructor's Edition only

Instructional Supplements provide suggestions for teaching the basic skills included in each assignment sheet or job sheet. They are located directly in front of the components they support—assignment or job sheets—in each unit.

Assignment Sheets

Assignment sheets provide students with information and exercises that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit component for such information.

Assignment Sheet Answers — Instructor's Edition only

This component is designed to assist the instructor in evaluating student performance on assignment sheets.

Job Sheet

Job Sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlined in each job sheet. Furthermore, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or salon situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests — Instructor's Edition only

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet. The check-off list allows instructors to evaluate a student's process performance of the task on the job sheet. The overall competency indicator allows the instructor to evaluate the end product.

Written Test — Instructor's Edition only

This component provides criterion-referenced evaluation of every objective listed in the unit of instruction. If objectives have been added, deleted, or modified, appropriate changes should be made on the test.

In order to measure and document student competency gains as required by the latest Carl Perkins regulations, and as outlined in the Oklahoma-developed system of standards and measures, it is *absolutely essential* that the same test be used as a pretest and as a posttest. If you choose to use tests other than the ones included herein, be sure that the same instrument is used for each activity—pre- and post test.

A detailed explanation of the Oklahoma plan for standards and measures and the Carl Perkins requirements is included in the CIMC publication, *Measuring Learning & Competency Gain: The Pretest/Posttest Approach.* This booklet and accompanying software designed to assist in calculating and recording student gains are available to all vocational teachers through the school's vocational testing liaison.

To further assist vocational teachers, the CIMC is in the process of developing test code sheets for each written test in its more recent publications, including this one. These code sheets are explained in Section 8 of the publication mentioned above, and will greatly assist in verifying that the test is a valid instrument for measuring student learning and competency gains.

Written Test Answers — Instructor's Edition only

This component is designed to assist the instructor in evaluating student performance on written tests.

COMPETENCY PROFILES

A competency profile is in the front of each publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***Introduction to Interior Systems*** has not been abbreviated. Each unit will be recognized by the unit number in Arabic numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since some CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in *Introduction to Interior Systems*, which is Unit 2, would look like this:

> OBJECTIVE SHEET - **Introduction to Interior Systems**
> **CIMC** - A2 - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

CORRECTIONS AND SUGGESTIONS

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To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Coordinator of Development
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

For a free catalog, a list of new publications, or other instructional materials information call 1-800-522-5810, extension 589.

RESALE

BASIC SKILLS IN CURRICULUM

The CIMC has always been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

Recent state and federal legislation mandates vigorous basic skills development in vocational education in the wake of demands by industry that workers *must* be academically, as well as technically, competent, given the nature of the highly complex work place. In response, the CIMC has taken the following steps to document that, indeed, the instructional materials *do* combine academic skills training with the vocational training. In addition, concerted efforts have been made to "beef up," or enhance the basic skills instruction already present. Following is a brief description of those processes:

Basic Skills Icons and Enablers

To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, and a list of specific tasks, or enablers, to identify the basic skill or skills that are called for in each job or assignment sheet.

Each of the nine broad skills areas—reading, writing, mathematics, science, oral communication, interpersonal or relating, creative thinking and problem solving, employability, and social studies—is represented by the icon presented below.

Reading

Science

Creative Thinking/ Problem Solving

Writing

Oral Communication

Employability

Math

Interpersonal or Relating

Social Studies

When an activity involving one of these basic skills is identified, the corresponding icon is placed in the left-hand margin of the job or assignment sheet. The basic skills training is further defined by retrieving the specific, or enabling, skill that is required by consulting a list of over two hundred and fifty enablers that has been compiled and grouped with each general basic skill. This enabling skill is placed directly below the icon.

As an example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and reference skills. The basic skills that the exercise promotes would be depicted in the left-hand margin as follows:

ASSIGNMENT SHEET

PLANNING LIVING SPACE FOR HUMAN NEEDS

1

Name ______________________________ Score ________

OBJECTIVE 10

Define personal territory.

INSTRUCTIONS

Reading Comprehension
- Gain factual information

Functional Reading
- Follow written instructions
- Use content area vocabulary

Language
- Use standard grammar, spelling, and capitalization
- State ideas clearly

- As discussed in Objective 1, each person has an invisible "space bubble" or comfort zone. A comfort zone is the space between oneself and others that brings a feeling of well-being. When one's comfort zone is crowded or invaded, discomfort often results. Therefore, personal territory needs should be a prime consideration when planning living space.
- For each of the following situations, draw your estimated comfort zone around the figures provided.
- Indicate how many inches from your body the comfort zone extends.
- Consider how that comfort zone changes in different situations. Answer the questions that follow.

Basic Skills Documentation Matrix

Another component of the CIMC basic skills instructional plan is the "Basic Skills Documentation Matrix." The matrix graphically summarizes the basic skills training included in the vocational program, unit by unit. It should be helpful to teachers in planning their instruction, and to administrators as documentation that basic skills are being addressed during the vocational training.

The matrix for this publication is included as an 8½" by 11" foldout in this *Instructor's Manual.*

Matrices have been developed for most CIMC publications. For more information on those available for other programs, call the CIMC at 1-800-654-4502.

Instructional Supplement

The supplement is a tool for the instructor to use in helping students apply the basic skills in Assignment Sheets and Job Sheets. Some supplements are appropriate for use with all students; some are for use only with those students who do not understand the academic skills called for in the exercise.

MEASURING STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single Written Test. This test should be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. Detailed information regarding performance gains analysis is contained in the CIMC publication, *Measuring Learning & Competency Gains: The Pretest/Posttest Approach*. In addition, the CIMC has developed a computer program, CARL, which will perform all necessary calculations and will print out a record form of all information required for gain score analysis. Copies of CARL and the publication are available through your local testing liaison (in Oklahoma), or from the CIMC at 1-800-654-4502.

REQUIRED CRITERIA FOR A COMPETENCY-BASED EDUCATION PROGRAM

Criterion	**Discussion**	**CIMC component meeting criterion**
1. Instruction is based on clearly-stated learning objectives that are: a) observable and measurable, and b) communicated in writing to students before instruction begins.	Learning objectives drive CBE. Objectives are the "competencies" that learners must achieve. Each objective must clearly state what *learners* must *do* to demonstrate acquired skill or knowledge. Verbs in learning objectives are active and precise, stating the exact performance expected of learners. The objectives should also specify the standard or level of performance required. Objectives can be at any level of Bloom's Taxonomy and can include the cognitive, psychomotor, and affective domains. Higher-order cognitive skills should be included.	Objective Sheet
2. Instruction is aligned with the stated learning objectives	In CBE, the objectives specify what is taught. "Content" should relate to one or more objectives. The curriculum should cover all objectives with relevant information.	Information Sheet
3. There is a student evaluation system that is: a) criterion-referenced, and b) aligned to the learning objectives and the curriculum.	In CBE, the aim is to bring the performance of *all* learners up to a pre-defined standards and competencies. Learners work on each competency until they achieve "mastery"; the evaluation system should test and record this mastery. Learners can restudy and retest as often as needed. Specific remediation activities should also be available to learners when needed. The evaluation system focuses on what each student has achieved, not on what the instructor has "taught." The "constant" in CBE is student performance; the "variables" are time and resources. (This differs from traditional systems where learners get one chance at mastery; some succeed and some fail. In such systems, time and resources are constant and student achievement is variable.) If an evaluation is criterion-referenced, successful learner performance is defined by (or *referenced* to) mastery of pre-set objectives and standards (or *criteria*): there must be a careful match (or *alignment*) between what the student should master (objectives), what is taught (curriculum), and what is tested. Objectives, curriculum, and evaluation system must all match.	Written Test and Job Sheet/Skill Test

Criterion	Discussion	CIMC component meeting criterion
4. **There is an observable management system of cognitive skill practice that provides for, promotes, and documents mastery learning.**	For both cognitive and psychomotor skills, a CBE program must have a system of maintaining records of which skills and activities each learner has completed, which ones are in progress, and which ones have not yet been completed. Completion means "mastery"; no skill is completed until the learner has achieved the mastery level. The record system should promote feedback on student skill attainment to *both* instructor and learners, provide for remediation as needed, and encourage reevaluation of learner performance until mastery is achieved. Appropriate remediation strategies often should consider learning styles and other individual differences among learners. Learners should work on skills and activities until they achieve mastery. They should not be "passed on" without mastery. While learners may move ahead and work on other skills (i.e those for which all prerequisite skills have been mastered or those without prerequisites), work should also continue on the skills still requiring mastery. Students should not attempt higher-order skills until all prerequisite skills are mastered.	Assignment Sheet
5. **There is an observable management system of psychomotor skill practice that provides for, promotes, and documents mastery learning.**		Job Sheet/Skill Test
6. **Skill mastery records are maintained for each learner, and learners have access to and make use of these records to monitor their skill acquisition.**	Records should clearly indicate the skills each learner has mastered. One such record should profile or list the competencies that have been mastered and those to be mastered. Other performance indicators can be added and kept in a portfolio for each learner. Learners should have ready access to their portfolios to monitor their own progress in skill mastery and competency attainment.	Competency Profile

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OBJECTIVE SHEET

INTERIOR SYSTEMS MATERIALS **A 1**

INTRODUCTION

The study of interior systems deals with proper installation and finishing of the exposed interior surfaces of a building such as floors, walls, and ceilings.

In this unit, you will be identifying and taking off or estimating the amount of materials used for trimming and finishing those interior surfaces.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to identify and estimate interior materials. The student will demonstrate these competencies by completing the assignment sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with interior systems materials, match them to their correct definitions.
2. Given drawings, identify insulation types.
3. Identify standard sizes and shapes of drywall.
4. Name types and major characteristics of ceiling systems.
5. Given alternatives, select the proper title of interior trim types.
6. Provided drawings, match the correct titles of interior window and door parts.
7. Name types of finish flooring and underlayment.
8. Calculate the number of 4′ × 8′ sheets of underlayment needed to floor a room

9. Estimate the number of ceiling tiles needed to finish a ceiling.

10. Calculate the material required to insulate a structure. (Assignment sheet 1)

11. Estimate materials needed to drywall a structure. (Assignment Sheet 2)

12. Estimate materials needed to trim a room. (Assignment Sheet 3)

13. Given a drawing, match the correct titles to parts of a cabinet. (Assignment Sheet 4)

INTERIOR SYSTEMS MATERIALS A 1

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with interior systems materials, match them to their correct definitions.

- Use the Information Sheet to discuss materials used in interior systems.
- Show students examples of material as they are defined.

Objective 2: Given drawings, identify insulation types.

- Discuss the functions of insulation.
- Describe where types of insulation are used.

Objective 3: Identify standard sizes and shapes of drywall.

- Discuss where each size might be used.
- Ask students to survey local distributors for available sizes.

Objective 4: Name types and major characteristics of ceiling systems.

- Describe the common ceiling systems and those you have seen in your area.

Objective 5: Given alternatives, select the proper title of interior trim types.

- Show the class examples of various types.
- Make flashcards of various types.

Objective 6: Provided drawings, match the correct titles of interior window and door parts.

- Discuss door and window classifications.
- Show both solid-core and hollow-core doors.

Objective 7: Name types of finish flooring and underlayment.

- Discuss factors that are used to select finish flooring.
- Describe the types of underlayment available.

Objective 8: Calculate the number of 4′ × 8′ sheets of underlayment needed to floor a room.

- Describe the use of adhesives and safety concerns in using them.

Objective 9: Estimate the number of ceiling tiles needed to finish a ceiling.

- Provide an example and allow student to estimate the number of ceiling tiles needed for a given size structure.

APPLICATION

Objective 10: Calculate the material required to insulate a structure. (Assignment Sheet 1)
Objective 11: Estimate materials needed to drywall a structure. (Assignment Sheet 2)
Objective 12: Estimate materials needed to trim a room. (Assignment Sheet 3)
Objective 13: Given a drawing, match the correct titles to parts of a cabinet. (Assignment Sheet 4)

- Allow students to practice the procedures in the assignment sheets.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

UNIT REFERENCES

- Toenjes, Leonard P. *Building Trades Dictionary.* American Technical Publishers, Inc.: Homewood, IL 1989.
- Willey, Al. *Residential Carpentry.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America. 1993.

INFORMATION SHEET

INTERIOR SYSTEMS MATERIALS **A 1**

OBJECTIVE 1

Given a list of terms associated with interior systems materials, match them to their correct definitions.

- Cabinets
  - **backsplash** — raised portion on back edge of a counter top
  - **base cabinet** — cabinet unit that rests on the floor
  - **counter top** — preformed or shop-built top of base unit
  - **kickboard** — face of the base cabinet at the toe space
  - **soffit** — underside or lower part of a cornice, arch, or furr down or any such overhanging assembly
  - **top or wall cabinet** — cabinet unit attached to wall above base unit
- Drywall
  - **backing** — wood nailed between structural members to provide a solid base for nailing drywall
  - **bedding** — process of filing the joints in drywall
  - **dimple** — impression on drywall surface formed by a nail driven to proper depths
  - **double nailing** — pattern used when two nails are spaced 2 inches apart every 12 inches; pattern used on intermediate joists and studs
  - **drywall** — rigid sheathing material made with a non-combustible core (usually gypsum) that is surfaced with treated paper or some other sheet material; sheathing material applied to interior finish walls and ceilings

- **featheredge** — to spread joint compound or topping so that it tapers to a very thin edge
- **joint** — place where edges of two pieces of drywall meet
- **joint compound** — material used to embed perforated tape to drywall joint, to finish over tape and corner bead, and to finish over nail and screw heads
- **perforated tape** — thin paper material used with joint compound to help cover and reinforce joints in drywall construction
- **topping** — finish coat of compound that covers all previous coats

- **Insulation**
  - **acoustic** — insulation that is used to inhibit sound waves
  - **condensation** — process by which vapor becomes liquid
  - **insulation** — material used as a barrier to inhibit thermal and sound transmission; insulation usually consists of mineral fibers
  - **moisture penetration** — process by which moisture moves into a structure
  - **perimeter insulation** — insulating material installed at foundation and floor slab around a structure
  - **R-factor** — an industry standard used to define insulation effectiveness
  - **reflective insulation** — material that limits transmission of heat by means of foiled backing material
  - **thermal** — air temperature
  - **vapor barrier** — material that retards passage of moisture into or through building elements

- **Architectural millwork/trim**
  - **apron** — horizontal trim immediately under a window stool
  - **astragal** — molding attached to edge of one of a pair of doors or windows to prevent swinging through; also provides a weather seal
  - **base** — molding covering bottom edge of wall where the wall and floor meet
  - **batten** — narrow strips of wood of metal used to cover joints of sheathing (commonly vertical joints) or other materials to seal the joints
  - **casing** — framework or trim of various widths and thicknesses used around windows and doors
  - **chair rails** — horizontal trim molding attached to a wall 32" above the floor as ornamentation and protection against damage from chairs being pushed against the wall
  - **clearance** — spacing between edge of door and jamb, and between jamb and trimmer stud
  - **cove** — concave interior corner molding
  - **crown** — trim member along the intersection of interior walls and ceilings
  - **door frame** — assembly of wood parts that form the enclosure and support for a door
  - **door stop** — small device installed to limit the swing of a door in order to protect door, wall or another door
  - **door stop molding** — molding nailed to the face of a door frame to prevent door from swinging through
  - **jig** — device used to guide tools or materials when performing a particular job

- **miter joint** — joint between two pieces of material at an angle that bisects the angle of junction
- **quarter round** — trim molding with quarter circle profile
- **shoe** — called a base shoe — strip of trim molding at baseboard and floor
- **window stool** — interior horizontal shelf member at the bottom of a window frame

- **Walls and ceilings**

  - **cap molding** — trim nailed to wall at top edge of wainscoting
  - **cope** — to cut or shape the end of a piece of molding so that it will match the contour of the mating member
  - **furring** — strips of wood or metal applied to surface to make it straight and plumb and to provide fastening surface for finish materials
  - **lath** — metal, wood, or gypsum product fastened to structural members to create a backing or base for plaster
  - **plaster** — mixture of lime, cement, and sand applied to walls and ceilings as a finish material
  - **plastic laminate** — thin sheet of hard, smooth, synthetic material that is highly resistant to scratching and wear; used for wainscoting, wall paneling and counter tops
  - **putty stick** — material used to fill holes in finished surface; is color-coded to match finished surface
  - **reveal** — space or setback between casing or trim and the edge of a door or window frame; usually ⅛" to ⅜"
  - **template** — gauge or pattern used to form multiple identical components or designs

- **Flooring**
  - **adhesive** — glue, cement, mastic, paste, or any substance capable of holding materials together by surface attachment
  - **epoxy** — plastic-like substance that is applied as a liquid and hardens to a durable finish; used both as underlayment and finish flooring
  - **resilient flooring** — finish flooring that conforms to surface upon which it is laid

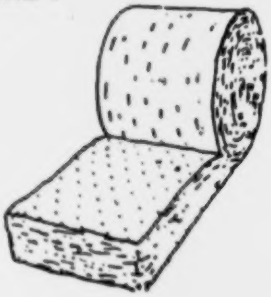
    EXAMPLES: Vinyl flooring, asphalt tile
  - **underlayment** — material applied over subfloor to provide a smooth surface for the finish floor

OBJECTIVE 2 **Given drawings, identify insulation types.**

NOTE: There are many types of insulation other than those listed below. Examples of other types of insulation include lightweight aggregates such as vermiculite, perlite, blast furnace slag, burned clay products, and cinders. Aggregates are commonly used in plaster and concrete to improve the insulating qualities of these materials.

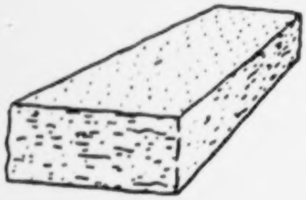
- Flexible batt insulation

FIGURE 1



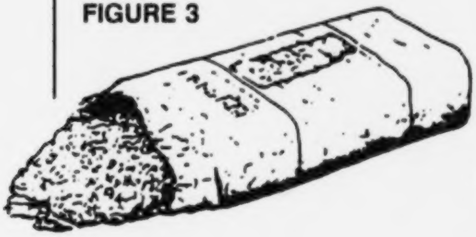
- Flexible blanket insulation (with and without paper backing)

FIGURE 2



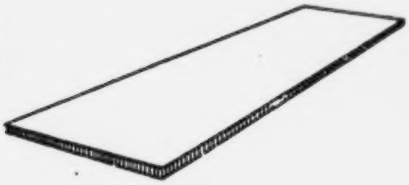
- Loose-fill insulation

FIGURE 3



- Rigid board insulation*

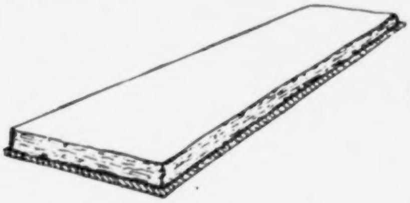
FIGURE 4



***NOTE:** Often used on wall frames, under slabs, and under slabs on-grade.

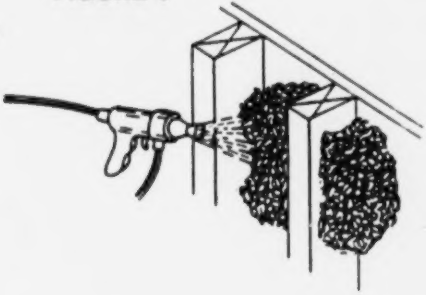
- Reflective insulation

FIGURE 5



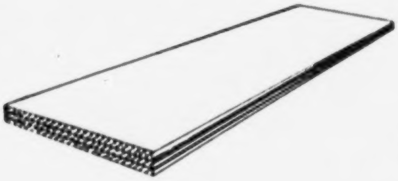
- Adhesive-type insulation

FIGURE 6



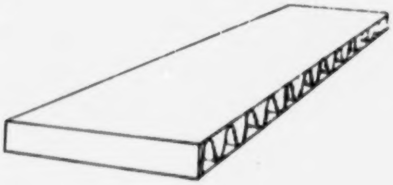
- Corrugated-paper insulation

FIGURE 7



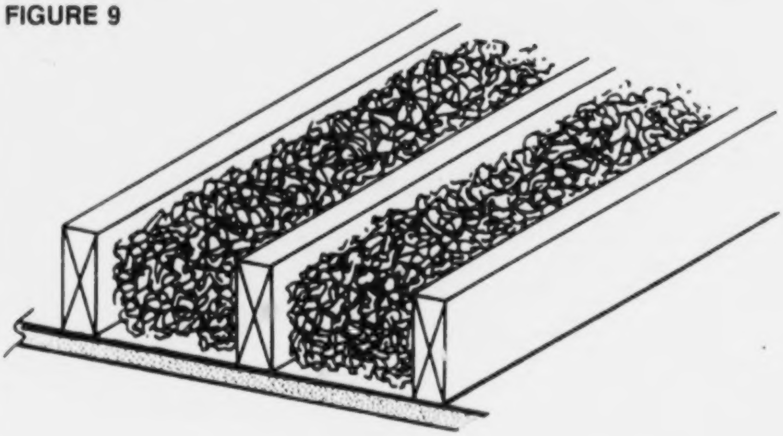
- Friction-batt insulation

FIGURE 8



- Loose-fill insulation (installed)

FIGURE 9



OBJECTIVE 3 **Identify standard sizes and shapes of drywall.**

- Standard sizes

  NOTE: Drywall can be special ordered to specific sizes. Being able to buy drywall in different sizes reduces building cost substantially.

  — Standard thickness

    NOTE: The ½-inch and ⅝-inch thicknesses are the most commonly used sizes.

    - ¼ inch
    - ⅜ inch
    - ½ inch
    - ⅝ inch
    - 1 inch (often called coreboard)

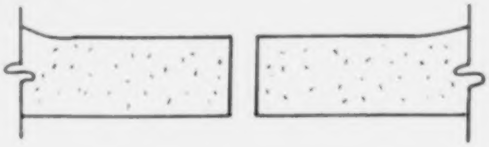
- Standard width — 4 feet

  NOTE: Most drywall comes in 4-foot widths.

- Standard lengths
  - 8 feet
  - 10 feet
  - 12 feet

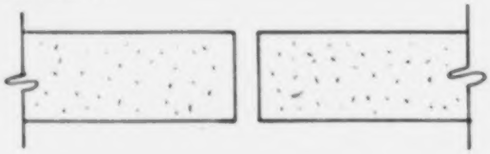
- Standard shapes
  - Tapered

FIGURE 10



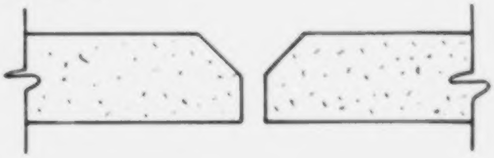
  - Square

FIGURE 11



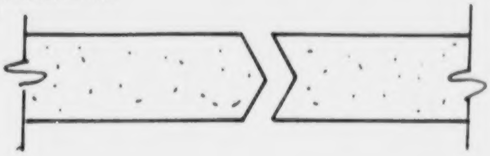
  - Beveled

FIGURE 12



— Tongue and groove (T & G)

FIGURE 13



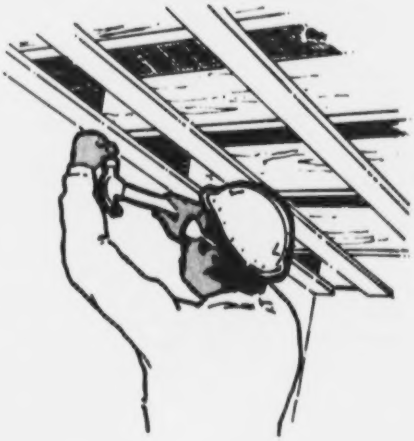
OBJECTIVE 4

Name types and major characteristics of ceiling systems.

- Drywall — attached to wood or metal ceiling joists
- Tile — attached to a solid ceiling

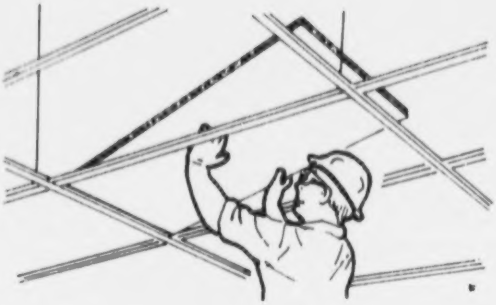
  — attached to furring strips (Figure 14)

FIGURE 14



- Tile panels — suspended using metal grid

FIGURE 15



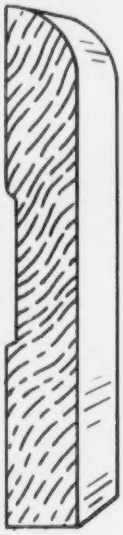
OBJECTIVE 5

Given alternatives, select the proper title of interior trim types.

NOTE: Examples of mold styles include colonial and sanitary.

- Base

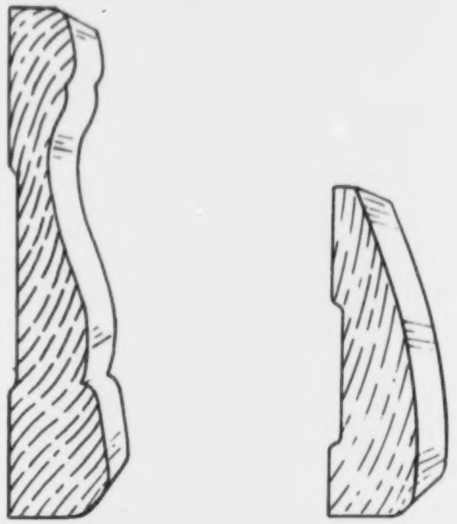
FIGURE 16



Sanitary
7/16" x 3 1/4"

- Casing

FIGURE 17

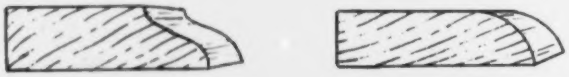


Colonial
9/16" x 2 3/16"

Sanitary
5/8" x 2 1/4"

- Doorstop molding

FIGURE 18

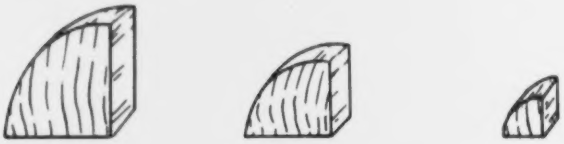


7/16" x 1 3/8"

3/8" x 1 3/8"

- Quarter round

FIGURE 19



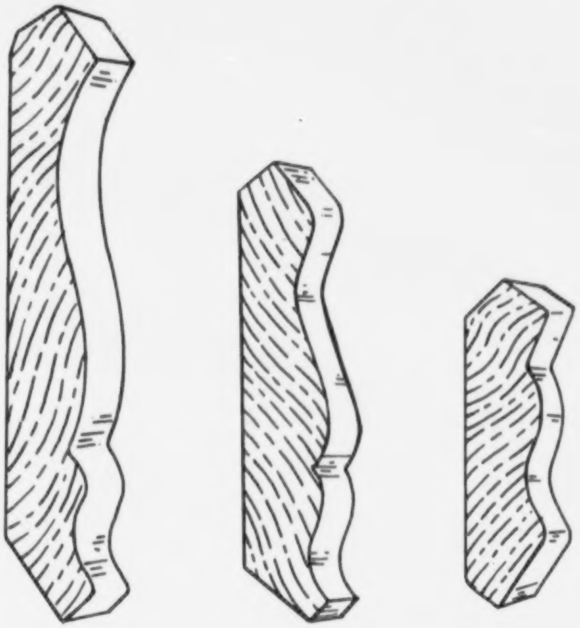
3/4" x 3/4"

1/2" x 1/2"

1/4" x 1/4"

- Crown

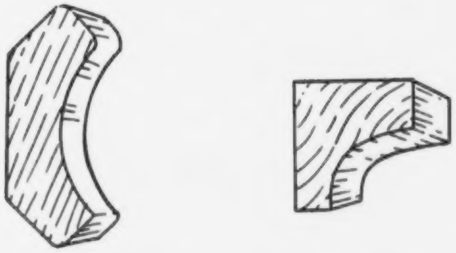
FIGURE 20



9/16" x 4 1/4" 9/16" x 3 5/8" 9/16" x 2 1/4"

- Cove

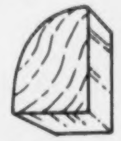
FIGURE 21



9/16" x 2 1/4" 3/4" x 3/4"

- Shoe molding (base shoe)

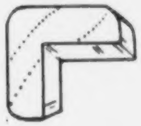
FIGURE 22



1/2" x 3/4"

- Outside corner

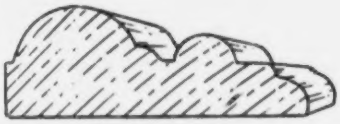
FIGURE 23



3/4" x 3/4"

- Chair rail

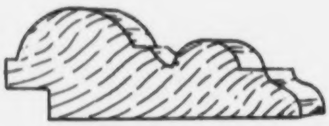
FIGURE 24



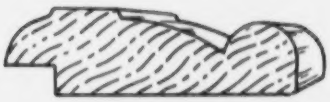
13/16" x 2 1/8"

- Cap molding (cap strip)

FIGURE 25



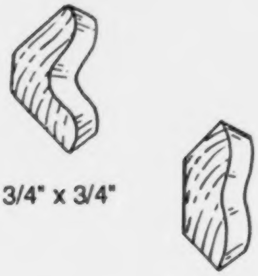
13/16" x 2 1/8"



9/16" x 2 1/16"

- Inside corner

FIGURE 26

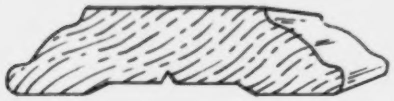


3/4" x 3/4"

5/16" x 1"

- Batten

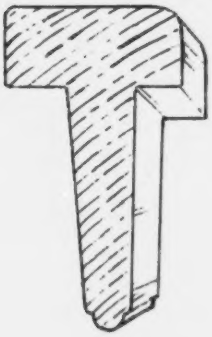
FIGURE 27



9/16" x 2 1/4"

- T-astragal

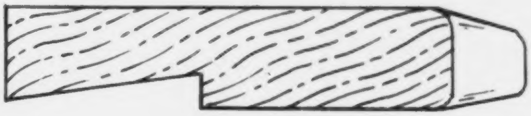
FIGURE 28



1 3/4" x 7"

- Window stool

FIGURE 29

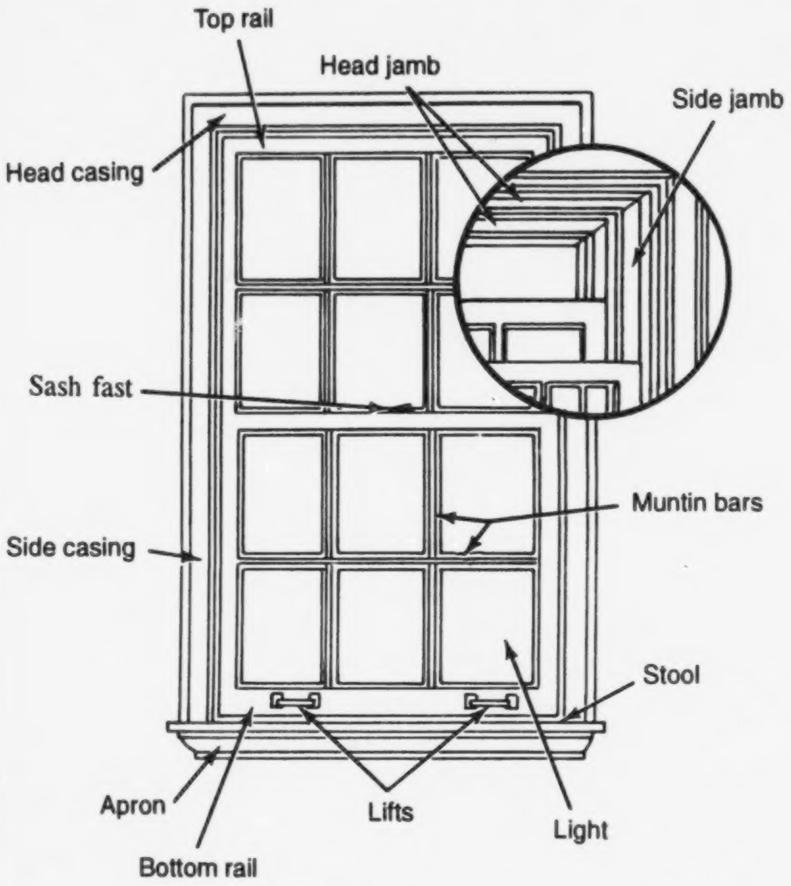


3/4" x 3 1/4"

OBJECTIVE 6 **Provided drawings, match the correct titles of interior window and door parts.**

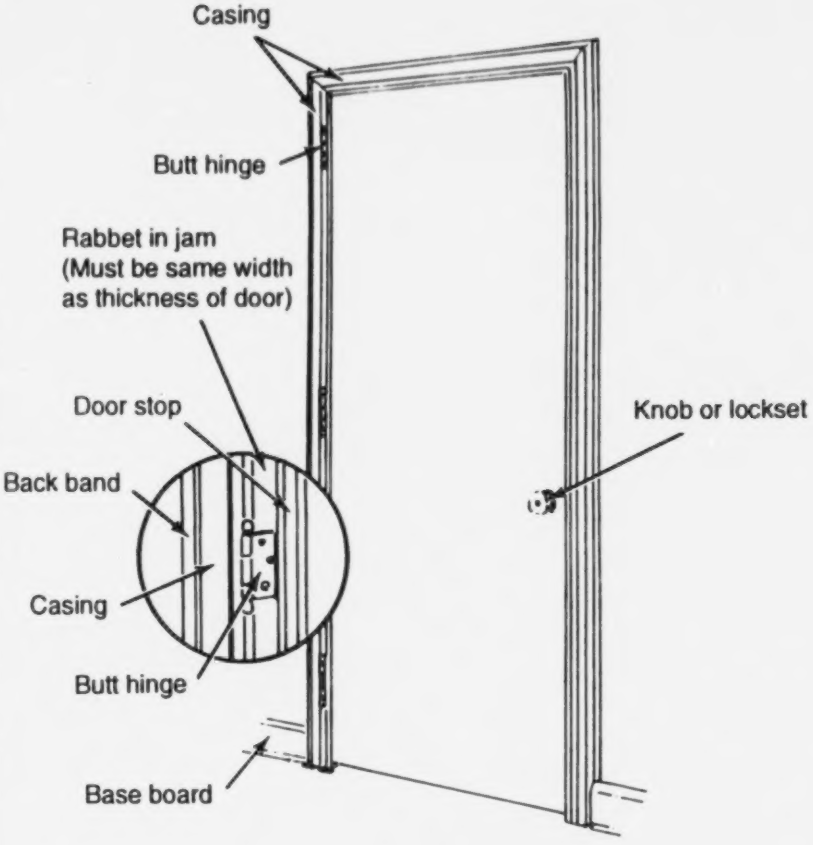
- Interior window parts/trim

FIGURE 30


Top rail
Head jamb
Side jamb
Head casing
Sash fast
Muntin bars
Side casing
Stool
Apron
Lifts
Light
Bottom rail

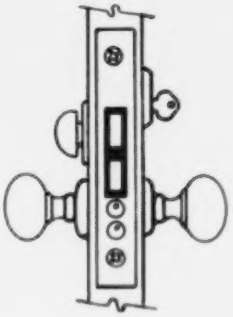
- Door parts/trim

FIGURE 31


Casing
Butt hinge
Rabbet in jam
(Must be same width
as thickness of door)
Door stop
Knob or lockset
Back band
Casing
Butt hinge
Base board

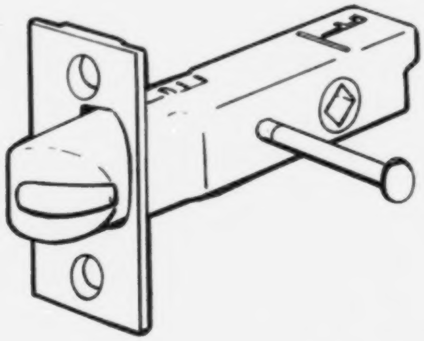
- Door hardware
  - Mortise lock

FIGURE 32



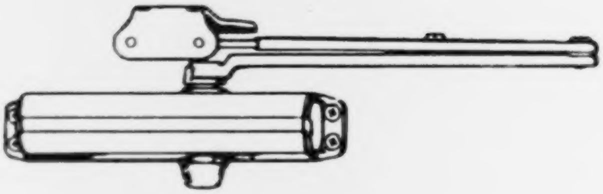
  - Tubular passage latch

FIGURE 33



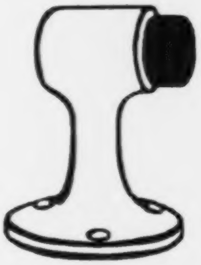
— Door closer

FIGURE 34



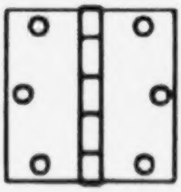
— Doorstop

FIGURE 35



    - Butt hinge

FIGURE 36



OBJECTIVE 7

Name types of finish flooring and underlayment.

- Finish flooring types
    - Hardwood
    - Resilient tile
    - Resilient sheet
    - Ceramic tile
    - Carpeting
    - Concrete
- Underlayment types
    - Plywood
    - Particle board
    - Hardboard
    - Wafer board

OBJECTIVE 8

Calculate the number of 4′ × 8′ sheets of underlayment needed to floor a room.

- Estimating underlayment

  NOTE: Most underlayment comes in 4′ × 8′ sheets, and the procedure below describes how to estimate underlayment material needs using 4′ × 8′ sheets.

  1. Measure or check plans to find length and width of room.
  2. Multiply length times width to find square footage to be covered with underlayment.

     EXAMPLE: If a room is 16 feet wide and 30 feet long, then 16′ × 30′ = 480 sq. ft. to be covered with underlayment.

  3. Divide square footage by 32 and round up to the next whole number, if necessary, to find the number of 4′ × 8′ sheets needed.

     NOTE: There are 32 square feet in one 4′ × 8′ sheet.

     EXAMPLE: If there are 480 square feet to be covered with underlayment, then 480 sq. ft. ÷ 32 sq. ft. = 15 sheets needed.

OBJECTIVE 9

Estimate the number of ceiling tiles needed to finish a ceiling.

- Estimating ceiling tiles

  1. Check plans or measure to find length and width of room.
  2. Round dimensions up to next whole foot, if necessary.

     EXAMPLE: If the room's actual measurements are 14′ 9″ × 29′ 2″, then use 15′ × 30′ when you are estimating.

3. Multiply length times width to find square footage of ceiling to be tiled.

   EXAMPLE: If a room's measurements are 15 feet × 30 feet, then

   15′ × 30′ = 450 sq. ft. of ceiling to be tiled.

4. Check packaging or measure to determine number of square feet covered by each tile.

5. Divide square footage of ceiling to be tiled by square feet covered per tile to find number of tiles needed.

   EXAMPLE: 1: If there are 450 square feet of ceiling and each 12″ × 12″ tile will cover 1 square foot, then

   450 ÷ 1 = 450 tiles needed to finish ceiling

   EXAMPLE 2: If there are 450 square feet of ceiling and each 12″ × 24″ tile will cover 2 square feet, then 450 ÷ 2 = 225 tiles needed to finish ceiling

OBJECTIVE 10 **Calculate the material required to insulate a structure.** (Assignment Sheet 1)

- Estimating insulation

  NOTE: When estimating materials, round up to the next even foot and then to the unit of packaging.

  1. Calculate square footage of exterior walls to be insulated.

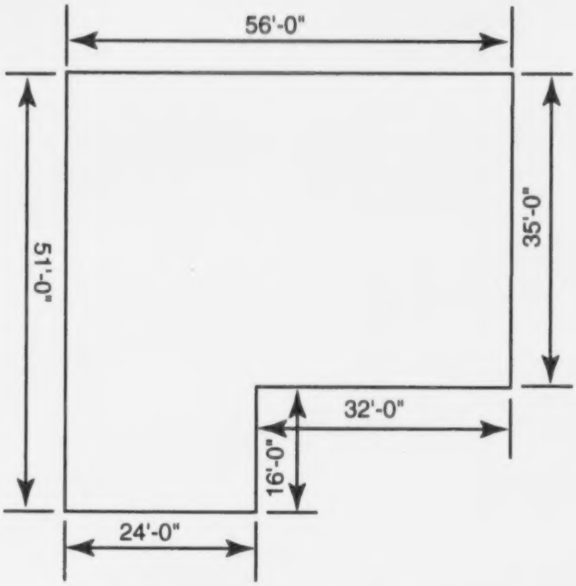
     a. Determine from plans length of perimeter of each exterior wall.

     b. Add lengths of all walls to find the structure's total perimeter.

EXAMPLE: If walls of a structure are 56 feet, 35 feet, 32 feet, 16 feet, 24 feet, and 51 feet (Figure 32), then

56′ + 35′ + 32′ + 16′ + 24′ + 51′ = 214′ = Structure's Total Perimeter

FIGURE 37



c. Multiply total perimeter by ceiling height to find total square footage of walls.

EXAMPLE: If the total perimeter of a structure is 214 feet and the wall height is 8 feet, then

214′ × 8′ = 1,712 sq. ft. = Total Square Footage of Exterior Walls

d. Determine from plans the total square footage of each opening.

e. Add the square footage of all openings to the total square footage of openings.

f. Subtract total square footage of openings from total square footage of walls to find square footage of walls to be insulated.

EXAMPLE: If the total square footage of walls is 1,712 square feet and the total square footage of openings is 174 square feet, then

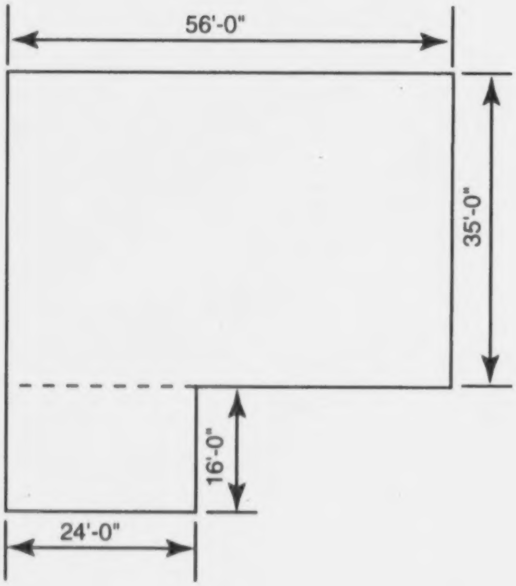
1,712 sq. ft. – 174 sq. ft. = 1,538 sq. ft.
= Square Footage of Exterior Walls to Be Insulated

2. Calculate square footage of ceilings to be insulated.

NOTE: The square footage of floor to be insulated is the same as the square footage of ceiling to be insulated.

a. Divide ceiling into rectangular or square areas and determine from plans the length and width of each area. (See Figure 38)

FIGURE 38



b. Multiply length times width to find square footage of each ceiling area.

EXAMPLE: If there are ceiling areas of 56′ × 35′ and 24′ × 16′, then

56′ × 35′ = 1,960 sq. ft.
24′ × 16′ = 384 sq. ft.

c. Add the square footage of all areas to find total square footage.

EXAMPLE: If there are ceiling areas of 1,960 square feet and 384 square feet, then

1,960 sq. st. + 384 sq. ft. = 2,344 sq. ft. = Total Square Footage of Ceilings to Be Insulated

3. Calculate total square footage of area to be insulated — Add square footage of exterior walls to be insulated to square footage of ceilings.

EXAMPLE: If the total square footage of exterior walls is 1,538 square feet and the total square footage of ceilings is 2,344 square feet, then

1,538 sq. st. + 2,344 sq. ft. = 3,882 sq. ft. = Total Square Footage of Area to Be Insulated

4. Calculate packages of batt insulation needed to insulate structure.

a. Determine number of packages needed to cover square footage of area to be insulated.

NOTE: Insulation packaging varies considerably with different manufacturers, types of materials, R-factors, and width and thicknesses of materials. See Table 1.

TABLE 1: Coverage of Batt Insulation in Packaging by Various Manufacturers

R-Value	Thickness	Width	Length	Total Coverage
38	12″	16″	48″	32 sq. ft. per pkg
38	13″	16″	48″	64 sq. ft. per pkg
19	6½″	15″	39½″	49 sq. ft. per pkg
19	6¼″	15″	94″	48.96 sq. ft. per pkg
19	6½″	15″	24″	120 sq. ft. per pkg
13	3⅝″	15″	62′8″	78 sq. ft. per pkg
13	3⅝″	23″	62′8″	120 sq. ft. per pkg
11	3½″	15″	70′6″	88 sq. ft. per pkg
11	3½″	15″	70′6″	176 sq. ft. per pkg
11	3½″	23″	70′6″	135 sq. ft. per pkg
11	3½″	23″	70′6″	270 sq. ft. per pkg

NOTE: Table 1 provides examples of common batt insulation packaging. Other sizes are available and include a width of 23″.

OBJECTIVE 11 **Estimate materials needed to drywall a structure.** (Assignment Sheet 2)

- Estimating drywall

  NOTE: Drywall is estimated in square feet.

  1. Determine total square footage to be covered with drywall.

     a. Check plans and compute square footage of wall and ceiling space in structure. Ignore openings such as doors and windows.

     b. Square footage =

        (total perimeter of walls × wall height) + (the ceiling width × ceiling length).

EXAMPLE: For a 12′ × 16′ room with a wall height of 8′, the square footage is:

Walls		Ceiling	
Wall perimeter	Wall height	Ceiling width	Ceiling length
(12′ × 2 walls) +		+ 12′ ×	16′
(16′ × 2 walls)	× 8		
(24′ + 32′)	× 8′	+ 192′	
448′		+192′ = 640 sq. ft.	

2. Determine number of sheets of each size of drywall needed.

   a. Compute number of 4′ × 8′ sheets needed.

      1) Multiply the total surface area (sq. ft.) × factor = number of drywall panels required. The "factor" is .03125 for 4 × 8 drywall panels.

         EXAMPLE: Using our previous specifications:

         640 sq. ft. × .03125 = 20 panels

         NOTE: Another method is to divide the total square feet by 32 (8 ft. sheets) or 40 (10 ft. sheets).

3. Determine amount of fastening and finishing materials needed.

   a. Use Table 2 to find the amount of nails, screws, joint compound tape, and texture paint needed per 1,000 square feet of drywall.

      NOTE: Nail spacing should be a minimum of 7 inches on ceilings and 8 inches on walls; however, when double nailing is used, nails are spaced 2 inches apart every 12 inches.

TABLE 2: Fastening and Finishing Materials Required for 1,000 Square Feet of Drywall

Material	
1¼″ annular-ring nail	6¼ lb.
1⅜″ annular-ring nail	6¾ lb.
1″ drywall screw	3 lb.
1¼″ drywall screw	4¼ lb.
1⅝″ drywall screw	5½ lb.
Ready-mix joint compound	80 lb. (50-lb. container)
Dry joint compound	50 lb. (25-lb. bag)
Perforated tape	370 lin. ft.
Texture paint	10 lb. to 50 lb. (25-lb. bags)

EXAMPLE: If a structure has 840 square feet to be covered with drywall and fastened with 1¼-inch annular-drywall screws, then multiply the amount needed for 1,000 square feet by the square footage to be covered, expressed as a decimal:

4¼ lb. × 840/1000 =

4¼ lb. × .840 = 3.6 lb. of drywall screws needed

b. Check manufacturer's recommendations to find the amount of adhesive needed for the type of adhesive you are using.

NOTE: Each type of drywall adhesive has a different coverage capability; therefore, always follow the manufacturer's recommendation.

c. Check plans and count the number of metal corners needed.

OBJECTIVE 12 **Estimate materials needed to trim a room.** (Assignment Sheet 3)

- Estimating material to trim a room

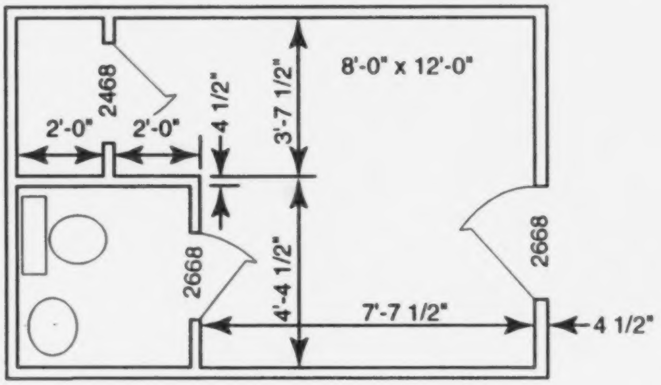
  1. Door units and hardware — Determine numbers, sizes, styles, and specifications from plans and schedules

     NOTE: When ordering doors, jamb sets, casing material, doorstops, hinges, locksets, and specialty hardware, specify how many of each item are required and other requirements such as those listed in the examples that follow.

  2. Trim — Determine number of lineal feet required from plans, and order each type of trim to the next highest even lineal foot

     NOTE: Schedules and specifications generally list doors and trim requirements. The listing in the example below is not intended to represent details or specifications but is meant only to show an example of material that might be used for the plan shown. (Figure 39)

FIGURE 39


2468
2'-0"
2'-0"
4 1/2"
3'-7 1/2"
8'-0" x 12'-0"
2668
2668
4'-4 1/2"
7'-7 1/2"
4 1/2"

a. Doors
   1) One 2′4″ × 6′8″ × 1⅜ hollow core, mahogany
   2) Two 2′6″ × 6′8″ × 1⅜ hollow core, mahogany

b. Jambs
   1) One 2′4″ interior jamb
   2) Two 2′6″ interior jamb

c. Casing and doorstops
   1) Two sets 2′4″ colonial casing
   2) Four sets 2′6″ colonial casing
   3) One set 2′4″ × ⁷⁄₁₆ × 1⅜ O.G. doorstop
   4) Two sets 2′6″ × ⁷⁄₁₆ × 1⅜ O.G. doorstop

d. Butt hinges — four and a half pairs 3½ inches square butt hinges

NOTE: Butt hinges are normally ordered in pairs. With each door requiring three hinges each, a total of nine hinges are required (4½ pair).

e. Locksets

  1) Two XYZ Lock Co. privacy lockset

  2) One XYZ Lock Co. passage latchset

f. Trim

  1) 65 lineal feet ½ inch × 3 inch colonial base

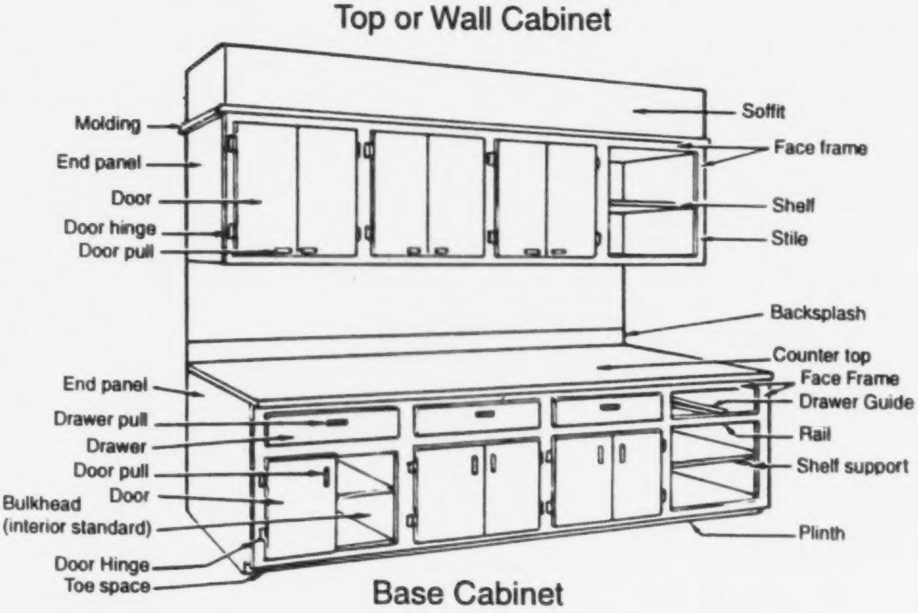
  2) 65 lineal feet ½ inch × ¾ inch shoe molding

  3) 8 lineal feet 1 inch × 1 inch outside corner

OBJECTIVE 13 **Provided drawings, match the correct titles to parts of a cabinet.** (Assignment Sheet 4)

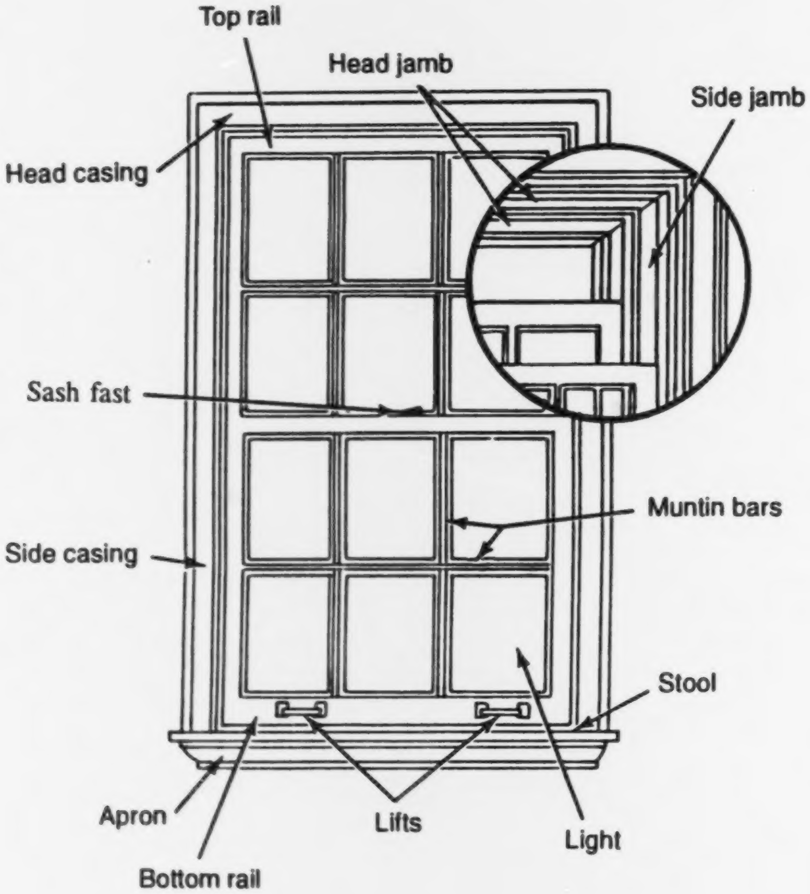
- Parts of a cabinet

FIGURE 40


Top or Wall Cabinet
Molding
End panel
Door
Door hinge
Door pull
Soffit
Face frame
Shelf
Stile
Backsplash
Counter top
End panel
Drawer pull
Drawer
Door pull
Door
Bulkhead
(interior standard)
Door Hinge
Toe space
Face Frame
Drawer Guide
Rail
Shelf support
Plinth
Base Cabinet

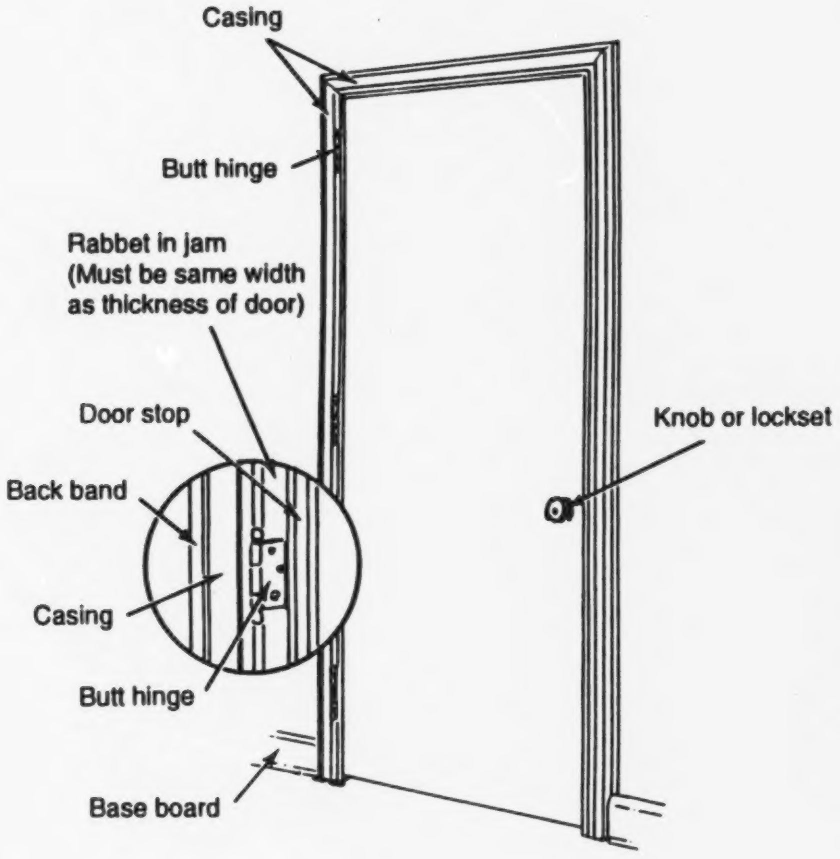
Parts of An Interior Window

TM 1

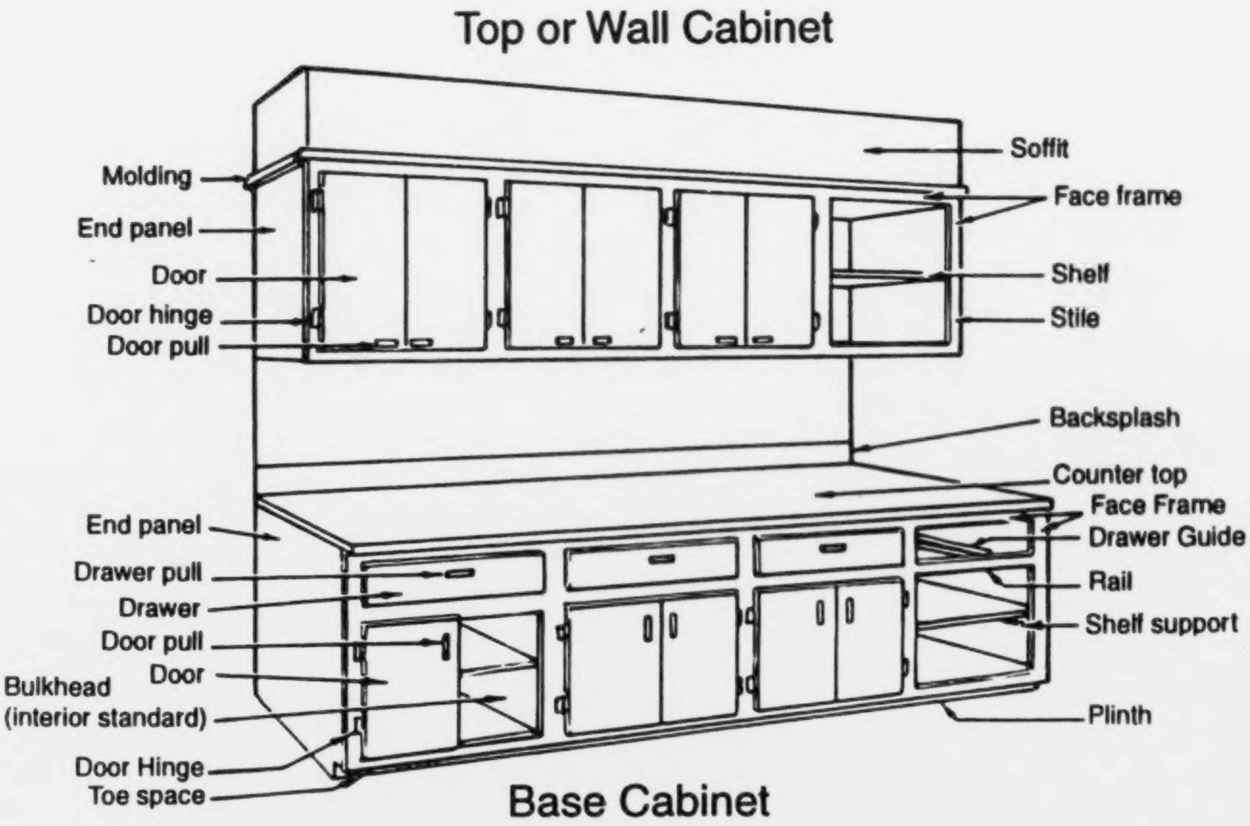

Top rail
Head jamb
Side jamb
Head casing
Sash fast
Muntin bars
Side casing
Stool
Apron
Lifts
Light
Bottom rail

Parts of An Interior Door

TM 2


Casing
Butt hinge
Rabbet in jam
(Must be same width
as thickness of door)
Door stop
Knob or lockset
Back band
Casing
Butt hinge
Base board

Parts Of A Cabinet


Top or Wall Cabinet
Molding
End panel
Door
Door hinge
Door pull
Soffit
Face frame
Shelf
Stile
Backsplash
Counter top
Face Frame
Drawer Guide
Rail
Shelf support
Plinth
End panel
Drawer pull
Drawer
Door pull
Door
Bulkhead
(interior standard)
Door Hinge
Toe space
Base Cabinet

ASSIGNMENT SHEET 1

INTERIOR SYSTEMS MATERIALS

A 1

Name ______________________________ Score __________

OBJECTIVE 10

Calculate the material required to insulate a structure.

INTRODUCTION

The insulation installer must practice estimating insulation materials because so many things must be considered. There are many different types of insulation materials, most of which may be applied in various forms, such as batts, loose fill, and rigid. Additionally, the amount of material required to obtain a particular R-factor must be considered as well as the most effective placement of that material.

DIRECTIONS

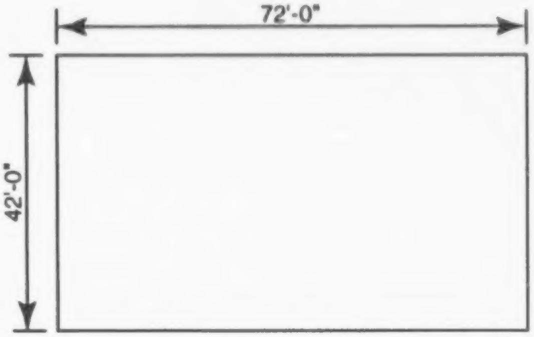
Use the illustrations and dimensions given to estimate insulation materials needed for each application method described. Show your work. Round all numbers to next highest unit.

Functional Reading Skills
- Interpret graphics and symbols

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions
- Solve formulae and equations

Math Application Skills
- Use English and metric measures

1. Estimate insulation materials needed for the structure illustrated below. The building will be constructed with a crawl space, 8′-0″ wall height, and 178 square feet of wall openings.



a. Packages of R-19 insulation required for walls at 49 square feet per package = ______________ packages

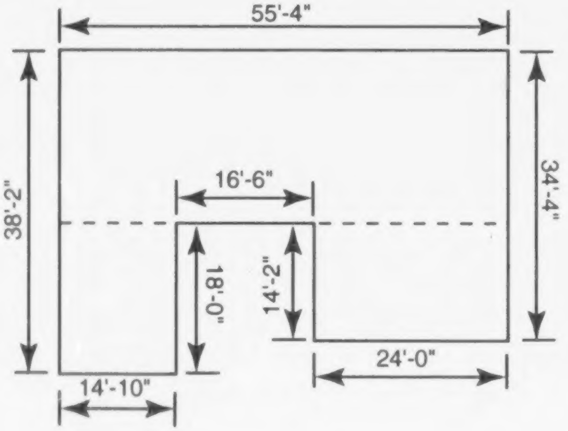
Job Acquisition/
Development Skills

- Master specific job task/procedure

b. Packages of R-38 insulation required for ceiling at 64 feet per package = _______________ packages

c. Packages of R-19 insulation required for floor at 49 square feet per package = _______________ packages

2. Estimate wall and ceiling insulation for the structure illustrated below. Finished wall height is 8′-0″ and total area of wall openings is 220 square feet.



a. Wall area to be insulated = _______________ square feet

b. Number of rolls of R-19 batt insulation required for walls with 120 square feet per roll = _______________ rolls

c. Ceiling area to be insulated = _______________ square feet

d. Number of packages of loose-fill insulation for R-38 in the ceiling if each package will cover 64 square feet = _______________ packages

ASSIGNMENT SHEET 2

INTERIOR SYSTEMS MATERIALS A 1

Name ______________________________ Score ________

OBJECTIVE 11 **Estimate materials needed to drywall a structure.**

INTRODUCTION

The use of drywall is a great convenience to the interior systems carpenter. It saves a great deal of time and money over constructing walls and ceilings from lath and plaster. However, these savings can be quickly lost if materials are poorly estimated. Estimates need to be accurate to avoid unnecessary handling of drywall or delays due to ordering too little material. This assignment will help you become proficient in estimating drywall materials.

Part 1

DIRECTIONS

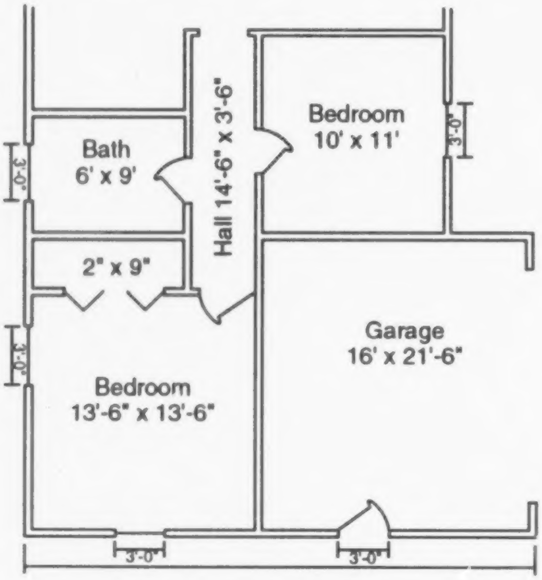
Calculate the square feet of walls and ceilings for the rooms in the structure illustrated below. Show your work in the space provided below and write the correct answers in the blanks. Round off your answer to the nearest whole number.

1. Bedroom #1, closet, with 8′ ceiling = ____________________
2. Bath and hallway with 8′ ceiling = ____________________
3. Garage with 12′ ceiling = ____________________

Operation and Calculation Skills
- Calculate with whole numbers
- Calculate with fractions
- Calculate with decimals
- Convert whole numbers to fractions
- Convert whole numbers to decimals
- Solve formulae and equations

Math Application Skills
- Use English and metric measures

Job Acquisition/ Development Skills
- Master specific job task/procedure



Part 2

DIRECTIONS

Using Table 1, estimate the amounts of the following materials needed to apply and finish drywall for the structure illustrated on the preceding page. Show your work in the space below and write the correct answers in the blanks.

- Bedroom #1:

  1. Number of sheets of drywall = ____________________
  2. Pounds of 1¼-inch annular-ring nails = ______________
  3. Feet of perforated joint tape needed = ______________
  4. Pounds of ready-mix joint compound needed = ________

- Bath and hallway:

  1. Number of sheets of drywall = ____________________
  2. Pounds of 1¼-inch drywall screws = ________________
  3. Feet of perforated joint tape needed = ______________
  4. Pounds of ready-mix joint compound needed = ________

- Garage:

  1. Number of sheets of drywall = ____________________
  2. Pound of 1¼-inch drywall screws = _________________
  3. Feet of perforated joint tape needed = ______________
  4. Pounds of ready-mix joint compound needed = ________

TABLE 1: Fastening and Finishing Materials Required for 1,000 Square Feet of Drywall

Material	
1¼″ annular-ring nail	6¼ lb.
1⅜″ annular-ring nail	6¾ lb.
1″ drywall screw	3 lb.
1¼″ drywall screw	4¼ lb.
1⅝″ drywall screw	5½ lb.
Ready-mix joint compound	80 lb. (50-lb. container)
Dry joint compound	50 lb. (25-lb. bag)
Perforated tape	370 lin. ft.
Texture paint	10 lb. to 50 lb. (25-lb. bags)

ASSIGNMENT SHEET 3

INTERIOR SYSTEMS MATERIALS

A 1

Name ______________________________ Score __________

OBJECTIVE 12

Calculate materials needed to trim a room.

INTRODUCTION

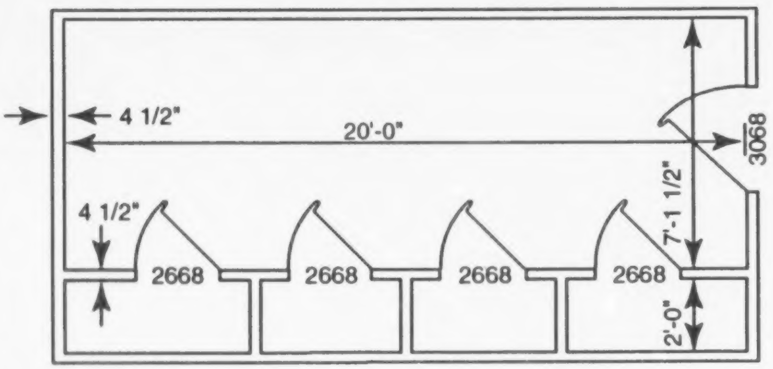
The competent carpenter knows how to estimate materials quickly and accurately for a specific job. Accurate estimation is cost effective and eliminates needless waste of materials and time. This exercise is meant to help you become a competent estimator.

DIRECTIONS

Estimate the amount of material needed to trim the room illustrated. Write your answers on the next page.

Functional Reading Skills
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures



Use 7/16″ × 3″ sanitary base, ⅝″ × 2¼″ sanitary casing, 7/16″ × ¾″ shoe molding. Use two 3½″ butt hinges on interior doors and three on exterior doors. Use streamline XYZ locksets on each flush-type door. One lockset is privacy; others are passage. Sanitary doorstops are ⅜″ × 1⅜″. Use 9/16″ × 2¼″ cove molding in large room only.

1. Doors
   a. Type — ____________________
   b. Size — ____________________
   c. Number — ____________________
2. Jamb sets
   a. Size — ____________________
   b. Number — ____________________
3. Casing and doorstop sets
   a. Type and size — ____________________
   b. Number of sets — ____________________
4. Butt hinges (pairs)
   a. Size — ____________________
   b. Number — ____________________
5. Locksets
   a. Type — ____________________
   b. Style — ____________________
   c. Brand — ____________________
   d. Number of each — ____________________
6. Other trim (lineal feet)
   a. Base — ____________________
   b. Shoe molding — ____________________
   c. Cove molding — ____________________

ASSIGNMENT SHEET 4

INTERIOR SYSTEMS MATERIALS

A 1

Name ______________________________ Score __________

OBJECTIVE 13

Provided drawings, match the correct titles to parts of a cabinet.

INTRODUCTION

Practice the identification of cabinet parts by matching the titles with the parts listed below.

DIRECTIONS

Write the correct letters in the blanks.

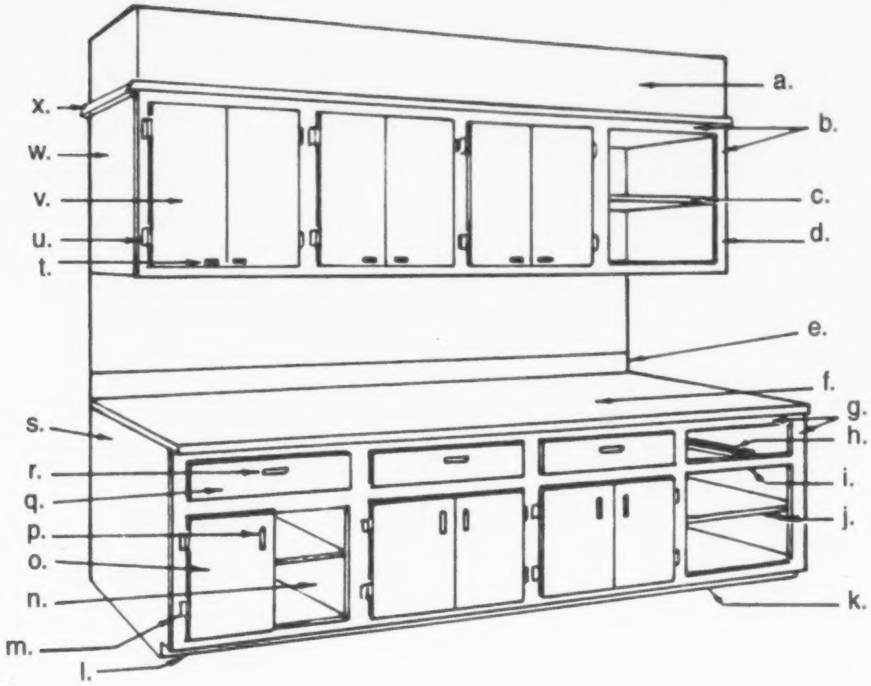
Functional Reading
- Use content area vocabulary

A. **Top cabinet**

____ 1. Molding
____ 2. End panel
____ 3. Soffit
____ 4. Stile
____ 5. Door
____ 6. Face frame
____ 7. Shelf
____ 8. Door hinge
____ 9. Door pull

B. **Base cabinet**

____ 1. Counter top
____ 2. Drawer
____ 3. Drawer pull
____ 4. Toe space
____ 5. Backsplash
____ 6. Drawer guide
____ 7. Door
____ 8. Door hinge
____ 9. End panel
____10. Door pull
____11. Shelf support
____12. Face frame
____13. Rail
____14. Kickboard
____15. Bulkhead (interior standard)


a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.
m.
n.
o.
p.
q.
r.
s.
t.
u.
v.
w.
x.

ASSIGNMENT SHEET 1

1. a. 34

   b. 48

   c. 62

2. a. 1,501

   b. 13

   c. 1,721

   d. 27

ASSIGNMENT SHEET 2

NOTE: These answers are only a reference guide. Due to variations in rounding and procedures, the assignment sheet must be evaluated to the satisfaction of the instructor.

Part 1

1. 808 sq. ft.
2. 633 sq. ft.
3. 1,244 sq. ft.

Part 2

1. 26 shts.	1. 20 shts.	1. 26 shts.
2. 5.1 lbs.	2. 2.7 lbs.	2. 5.3 lbs.
3. 299 lin. ft.	3. 234 lin. ft.	3. 460 lin. ft.
4. 64 lbs.	4. 51 lbs.	4. 100 lbs.

ASSIGNMENT SHEET 3

1. Doors
   - a. Type — Flush
   - b. Size — 2/6 × 6/8 and 3/0 × 6/8
   - c. Number — Four 2/6 × 6/8; one 3/0 × 6/8
2. Jambs
   - a. Size — ¾" × 4⅝"
     ¾" × 4⅝"
   - b. Number — four 2/6 ×6/8 interior jambs, one 3/0 × 6/8 exterior jamb
3. Casing and doorstop sets
   - a. Type and size — Sanitary casing ⅝" × 2¼" each door size
     Sanitary doorstops ⅜" × each door size
   - b. Number — Four sets 2/6 × 6/8, one set 3/0 × 6/8
4. Butt hinges (pairs)
   - a. Size — 3½"
   - b. Number — Five and one-half pairs
5. Locksets
   - a. Type — Passage and privacy
   - b. Style — Streamline
   - c. Brand — XYZ
   - d. Number of each — one privacy, four passage

6. Other trim (lineal feet)

   a. $\frac{7}{16}$" × 3" sanitary base — 78 feet

   b. $\frac{7}{16}$" × $\frac{3}{4}$" shoe molding — 78 feet

   c. $\frac{9}{16}$" × 2$\frac{1}{4}$" cove molding — 45 feet

ASSIGNMENT SHEET 4

A. Top cabinet

   1. x
   2. w
   3. a
   4. d
   5. v
   6. b
   7. c
   8. u
   9. t

B. Base cabinet

   1. f
   2. q
   3. r
   4. l
   5. e
   6. h
   7. o
   8. m
   9. s
   10. p
   11. j
   12. g
   13. i
   14. k
   15. n

WRITTEN TEST

INTERIOR SYSTEMS MATERIALS

A 1

Name ______________________________ Score ________

OBJECTIVE 1

Given a list of terms associated with interior systems materials, match them to their correct definitions. Write in the letter that corresponds to the most correct answer.

_____ 1. A device used to guide tools or materials when performing a particular job is a

a. reveal
b. coping tool
c. jig
d. soffit

_____ 2. Rigid sheathing material with a non-combustible core is

a. drywall
b. paneling
c. underlayment
d. vapor barrier

_____ 3. The raised portion on the back edge of a counter top is a

a. kickboard
b. soffit
c. backsplash
d. casing

_____ 4. A material that retards passage of moisture into or through building elements is a

a. topping
b. batten barrier
c. plaster inset
d. vapor barrier

May be photocopied for student use.

_____ 5. What is the material applied over the subfloor to provide a smooth surface for the finish floor?

a. resilient flooring
b. wainscot
c. furring strips
d. underlayment

_____ 6. The space or setback between casing or trim and the edge of a door or window frame is the

a. apron
b. reveal
c. gap-in-line
d. cope gap

_____ 7. The framework or trim around windows and doors is known as the

a. casing
b. apron
c. lath
d. kickboard

_____ 8. The process of filling the joints in drywall is called

a. topping
b. bedding
c. battening
d. putty sticking

_____ 9. The cabinet unit that attaches to the wall above base unit is the

a. counter top
b. top or wall unit
c. soffit unit
d. upper base unit

May be photocopied for student use.

_____10. The wood nailed between structural members to provide a solid base for nailing drywall is

- a. kickboard
- b. casing
- c. both a and b are correct
- d. backing

_____11. The face of the base cabinet at the toe space is known as the

- a. kickboard
- b. dimple
- c. toe board
- d. base

_____12. What are the strips of wood or metal applied to the surface to make it straight and plumb?

- a. Furring strips
- b. Wainscot
- c. Topping strips
- d. Template

_____13. What is the industry standard used to define the effectiveness of insulation?

- a. Resilient value
- b. Thermal load
- c. E-factor
- d. R-factor

_____14. The insulating material at the foundation and the floor slab around a structure is

- a. batten layer
- b. base insulation
- c. perimeter insulation
- d. cap molding

May be photocopied for student use

_____15. The joint between two pieces of material at an angle that bisects the angle of the junction is known as a

a. butt joint
b. miter joint
c. astragel
d. casing cut

_____16. A mixture of lime, cement, and sand applied to walls and ceilings as a finish material is

a. grout
b. plaster
c. latex paint
d. putty

_____17. The place where edges of two pieces of drywall meet is a/an

a. junction
b. apron
c. joint
d. all the above

_____18. The horizontal trim immediately under a window stool is called a/an

a. astragel
b. coping ledge
c. batten plate
d. apron

_____19. The spacing between the edge of the door and jamb, and between the jamb and trimmer stud is called the

a. clearance
b. r-factor
c. thermal gap
d. jig overlap

May be photocopied for student use

______20. The finish coat of joint compound that covers all the previous coats is the

a. crown
b. overlay
c. vapor barrier
d. topping

______21. The assembly of wood parts that form the enclosure and support for a door is known as

a. casing
b. door frame
c. battens
d. astragel

______22. Narrow strips of wood or metal used to cover joints of sheathing to seal the joints are

a. miters
b. furring strips
c. battens
d. underlayment

______23. A plastic-like substance when it hardens is

a. epoxy
b. astragel
c. miter gel
d. reveal

______24. To cut or shape the end of a piece of molding so that it will match the contour of the mating member is to

a. lath
b. batten
c. jig
d. cope

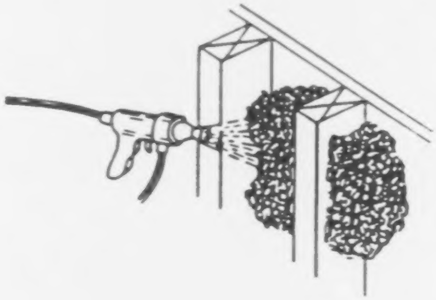
May be photocopied for student use.

_____25. Material used as a barrier to inhibit thermal and sound transmission is

a. molding
b. casing
c. insulation
d. featheredging

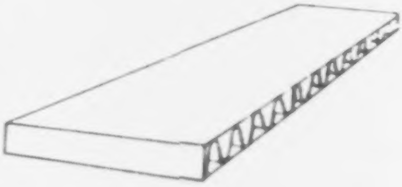
OBJECTIVE 2 **Given drawings, identify insulation types.**

_____ 1. The insulation type illustrated below is



a. adhesive-type
b. blown-in
c. paint-based
d. loose-fill

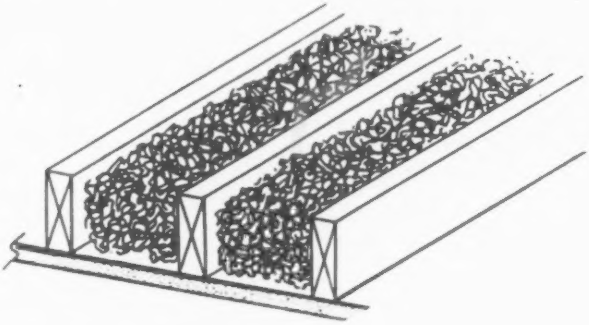
_____ 2. The type of insulation shown is



a. "V" batten
b. reflective
c. drywall-coated
d. friction-batt

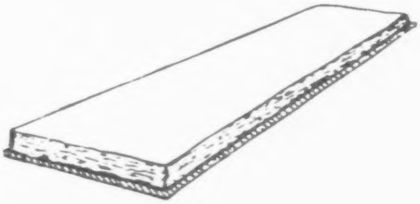
May be photocopied for student use.

_____ 3. The insulation pictured below is



a. friction-batt
b. reflective
c. loose filled
d. ground-based

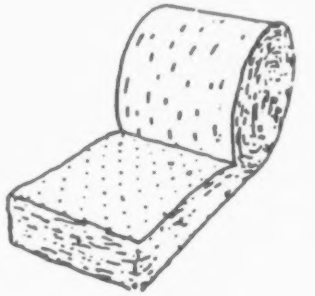
_____ 4. The type of insulation shown is called



a. reflective
b. friction-batt
c. adhesive-backing
d. loose-fill

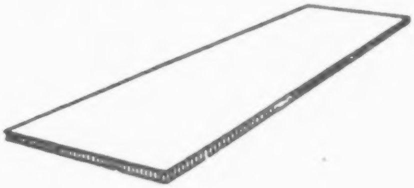
May be photocopied for student use.

_____ 5. This insulation type is



a. rigid-roll
b. flexible-batt
c. loose-fill
d. roll-foamed

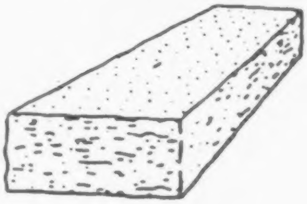
_____ 6. The type of insulation shown below is



a. rigid board
b. friction-batt
c. flat-layered
d. foamed-plastic

May be photocopied for student use.

_____ 7. This type of insulation is known as



a. rigid board
b. friction-batt
c. flexible blanket
d. blown-in

OBJECTIVE 3 **Identify standard sizes and shapes of drywall.**

_____ 1. Which of the following is NOT a standard thickness for drywall?

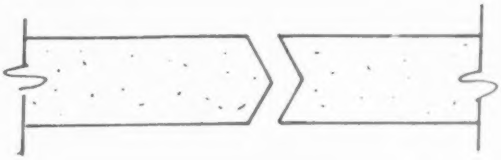
a. ¼″
b. ⅜″
c. ½″
d. ¾″

_____ 2. The standard size for drywall sheets is/are"

a. 4′ × 8′
b. 4′ × 10′
c. 6′ × 12′
d. both a and b are correct

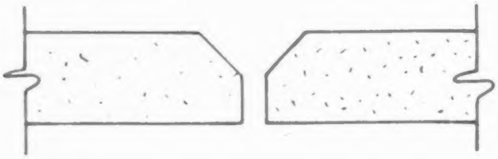
May be photocopied for student use.

_____ 3. The drywall represented below is



a. T & G
b. "V" edged
c. tapered
d. double beveled

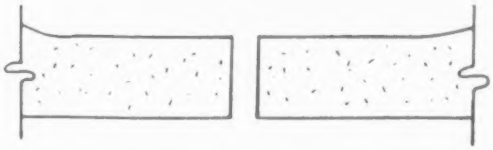
_____ 4. This illustration represents



a. tapered
b. square
c. beveled drywall
d. T & G drywall

May be photocopied for student use.

_____ 5. The shape of drywall shown below is known as



a. beveled
b. tapered
c. T & G
d. square

OBJECTIVE 4 **Name types and major characteristics of ceiling systems.**

_____ 1. Which of these are NOT a type of ceiling system?

a. Soffit ceiling using tile
b. Tile attached to solid ceiling
c. Tile attached to furring strips
d. Suspended ceiling

_____ 2. The type of ceiling that uses tile with metal grids is called a

a. grid ladder
b. drywall
c. suspended ceiling
d. overhead ceiling

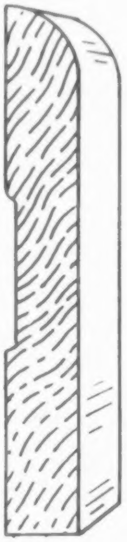
_____ 3. A ceiling type that attaches directly to ceiling joists is a

a. furring strip ceiling
b. drywall ceiling
c. suspended ceiling
d. overhead ceiling

May be photocopied for student use.

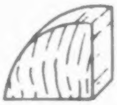
OBJECTIVE 5 **Given alternatives, select the proper title of interior trim types.**

_____ 1. The type of interior trim shown below is a



a. quarter round
b. cove molding
c. sanitary base molding
d. chair rail

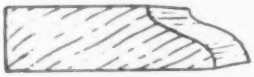
_____ 2. The type of molding represented below is a



a. half-round
b. cove
c. cap strip
d. quarter round

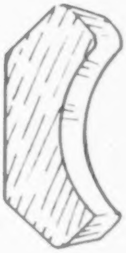
May be photocopied for student use.

_____ 3. The type of molding shown is a



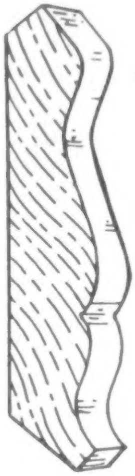
a. doorstop
b. base
c. casing
d. outside corner

_____ 4. This type of trim is a



a. quarter round
b. cap strip
c. cove
d. casing

_____ 5. The type of molding shown is a

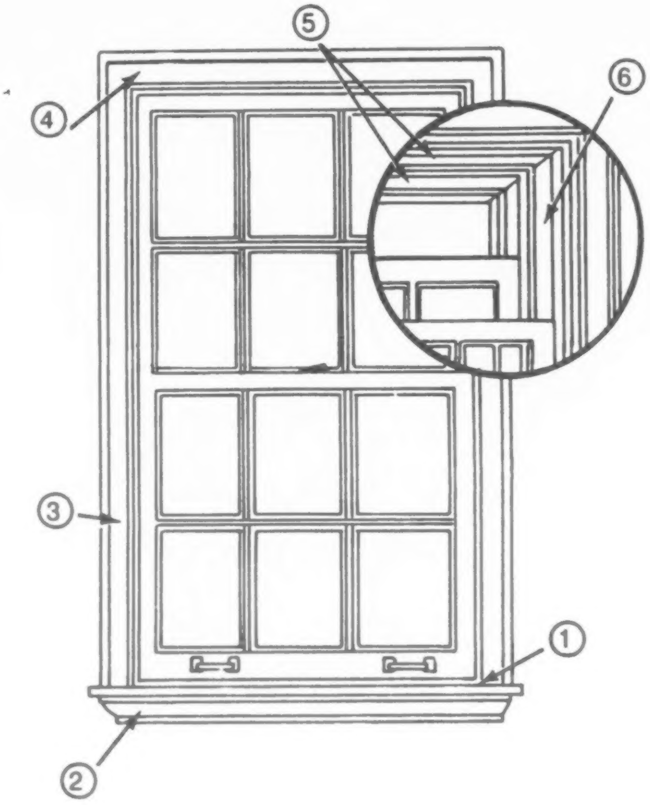


a. cove
b. crown
c. casing
d. cap strip

May be photocopied for student use.

OBJECTIVE 6 **Given a drawing, match the correct titles of interior window and door parts.**

INSTRUCTIONS Use the figure below to respond to questions 1-5.



_____ 1. The title of the window part indicated by the circled 1 is

- a. apron
- b. stool
- c. side jamb
- d. side casing

May be photocopied for student use.

_____ 2. The circled 2 is

a. stool
b. casing
c. jamb
d. apron

_____ 3. The circled 3 is

a. side casing
b. head casing
c. side jamb
d. stool

_____ 4. The window element indicated by the circled 4 is

a. side jamb
b. stool
c. top rail
d. head casing

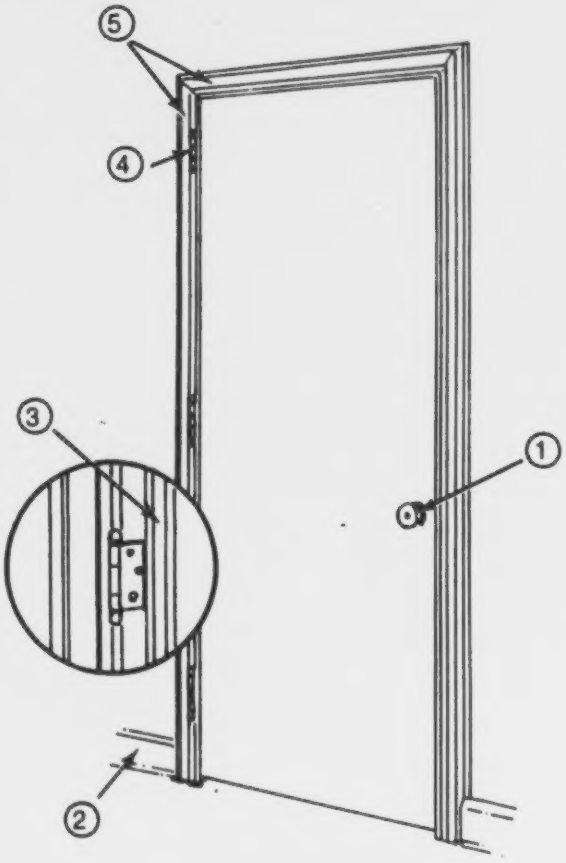
_____ 5. The element indicated with the circled 5 is

a. top casing
b. apron
c. head jambs
d. side jambs

May be photocopied for student use.

INSTRUCTIONS

Use the figure below to respond to questions 6-10.



_____ 6. The circled 1 on the illustration represents the

a. lockset
b. knob
c. casing
d. both a and b are correct

May be photocopied for student use.

_____ 7. The circled 2 represents a

a. casing
b. base board
c. butt hinge
d. base shoe

_____ 8. The door part indicated by the circled 3 is the

a. door stop
b. casing
c. butt hinge
d. base shoe

_____ 9. The circled 4 represents the

a. casing
b. butt hinge
c. base molding
d. knob or lockset

_____10. The circled 5 is the

a. casing
b. butt hinge
c. base molding
d. knob or lockset

OBJECTIVE 7 **Name types of finish flooring and underlayment.**

_____ 1. Which of the following materials are used as finish flooring?

a. Carpet
b. Hardwood
c. Ceramic tile
d. All the above

_____ 2. The material used for underlayment is

a. carpet
b. plywood
c. ceramic tile
d. all the above

May be photocopied for student use.

_____ 3. Which of the following material is NOT used as an underlayment?

a. Wafer board
b. Particle board
c. Resilient tile
d. Hardboard

OBJECTIVE 8 **Estimate the number of 4′ × 8′ sheets of underlayment needed to floor a room.**

_____ 1. A room measures 30′ × 40′. How many 4′ × 8′ sheets of underlayment are required?

a. 38
b. 40
c. 50
d. 52

_____ 2. A room measures 24′ × 32′. How many 4′ × 8′ sheets of underlayment are needed?

a. 20
b. 22
c. 24
d. 26

OBJECTIVE 9 **Estimate the number of ceiling tiles needed to finish a ceiling.**

_____ 1. If a room measures 18′ × 24′ and requires 12″ × 24″ tiles, how many tiles will be required?

a. 432
b. 200
c. 208
d. 216

May be photocopied for student use.

_____ 2. A suspended ceiling measures 19'10" × 14'0". How many 12" × 12" tiles are required?

a. 260
b. 280
c. 300
d. 320

NOTE: Objectives 10-13 are evaluated on assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

INTERIOR SYSTEMS MATERIALS

A 1

OBJECTIVE 1

1. c
2. a
3. c
4. d
5. d
6. b
7. a
8. b
9. b
10. d
11. a
12. a
13. d
14. c
15. b
16. b
17. c
18. d
19. a
20. d
21. b
22. c
23. a
24. d
25. c

OBJECTIVE 2

1. a
2. d
3. c
4. a
5. b
6. a
7. c

OBJECTIVE 3

1. d
2. d
3. a
4. c
5. b

OBJECTIVE 4

1. a
2. c
3. b

OBJECTIVE 5	1.	c	4.	c
	2.	d	5.	b
	3.	a		
OBJECTIVE 6	1.	b	6.	d
	2.	d	7.	b
	3.	a	8.	a
	4.	d	9.	b
	5.	c	10.	a
OBJECTIVE 7	1.	d		
	2.	b		
	3.	c		
OBJECTIVE 8	1.	a		
	2.	c		
OBJECTIVE 9	1.	d		
	2.	b		

OBJECTIVE 10-13 These objectives are evaluated through completion of assignment sheets.

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) *Introduction to Interior Systems*

UNIT NUMBER AND TITLE — A 1 Interior Systems Materials

TOTAL NUMBER OF TEST QUESTIONS 62

TOTAL NUMBER OF BASIC SKILL QUESTIONS 4

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-25	X
2	1-7	X
3	1-5	X
4	1-3	X
5	1-5	X
6	1-10	X
7	1-3	X
8	1-2	M
9	1-2	M
10-13	Evaluated on AS	

OBJECTIVE SHEET

INTERIOR SYSTEMS TOOLS

A 2

INTRODUCTION

Carpenters use many types of tools and equipment. Their safe and efficient use are the basic skills required of all carpenters.

This unit will provide you the knowledge to identify and safely use many of the tools used to install/finish interior systems.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to identify and use selected tools/equipment. The student will demonstrate these competencies by completing the assignment sheets, job sheets, and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with interior systems tools, match them to their correct definitions.
2. From alternatives, choose the proper care and safety guidelines for the use of hand and power tools.
3. Given drawings, identify hand tools used for the installation of interior systems. (Assignment Sheet 1)
4. Given drawings, identify power tools used for the installation of interior systems. (Assignment Sheet 2)
5. Use a hammer properly. (Job Sheet 1)
6. Use a handsaw. (Job Sheet 2)
7. Use a framing square and rule to lay out a corner. (Job Sheet 3)

8. Use a level. (Job Sheet 4)
9. Perform a ripping operation with a circular saw. (Job Sheet 5)
10. Use a T-square and a utility knife to measure and cut drywall. (Job Sheet 6)

SUGGESTED ACTIVITIES

INTERIOR SYSTEMS TOOLS A 2

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with interior systems tools, match them to their correct definitions.

- Show the class samples of the various terms.
- Use the Information Sheets to discuss the terms.

Objective 2: From alternatives, choose the proper care and safety guidelines for the use of hand and power tools.

- Ask a carpenter to visit your class.
- Show the AGC videos for safe use of tools.
- Assign students to research magazines and newspapers and to clip out articles that describe accidents resulting from the improper use of tools.

APPLICATION

Objective 3: Given drawings, identify hand tools used for the installation of interior systems. (Assignment Sheet 1)
Objective 4: Given drawings, identify power tools used for the installation of interior systems. (Assignment Sheet 2)

- Use the Information Sheet to identify tools.
- Show students tool catalogs and emphasize those tools used to install interior systems.
- Assign students to complete Assignment Sheets 1 and 2.

Objective 5: Use a hammer properly. (Job Sheet 1)
Objective 6: Use a handsaw. (Job Sheet 2)
Objective 7: Use a framing square and rule to lay out a corner. (Job Sheet 3)
Objective 8: Use a level. (Job Sheet 4)
Objective 9: Perform a ripping operation with a circular saw. (Job sheet 5)
Objective 10: Use a T-square and a utility knife to measure and cut drywall. (Job Sheet 6)

- Emphasize the safe use of tools.
- Demonstrate the procedures outlined in the job sheets.
- Allow students to practice the procedures in the job sheets.

EVALUATION

Pretest

- Give written test as pretest.
- Determine individual study requirements from pretest results.
- Counsel students individually on pretest results and study requirements.
- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on assignment sheet activities.
- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

The following VHS videos are available from AGC of America, 1957 E. Street N.W., Washington, D.C. 20006.

- *Eye and Face Protection*
- *Ladder Safety*
- *Working Safely on Scaffolds*
- *Head Protection*

UNIT REFERENCES

- Ball, John. *Exterior and Interior Trim.* Delmar Publishers. Albany, NY. 12205.
- Toenjes, Leonard P. *Building Trades Dictionary.* American Technical Publishers, Inc.: Homewood, IL. 1989.
- Willey, Al. *Residential Carpentry.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America. 1993.

INTERIOR SYSTEMS TOOLS A 2

OBJECTIVE 1

Given a list of terms associated with interior systems tools, match them to their correct definitions.

- **accessories** — objects or devices not essential in themselves but adding to the convenience or effectiveness of the tool or equipment
- **arbor** — rotating shaft on an electric tool
- **caulking gun** — tool used to hold and dispense caulking, sealants, and adhesives from tubes
- **drywall rasp** — tool used to smooth rough-cut edges of drywall
- **drywall foot lift** — tool designed so one end will fit under edge of drywall and will lift the drywall by putting foot pressure on the opposite end
- **fiber blowing machine** — equipment used to propel loose-fill materials from a hopper through a hose to the point of application
- **fret** — ornamental design
- **ground fault circuit interrupters (GFCI)** — special electrical circuits designed to prevent electrical shock to personnel
- **hone** — process of sharpening a cutting tool on a stone
- **hopper** — receptacle for delivery or discharging material to the point of application
- **miter box** — device used to guide a saw at the proper angle for cutting a miter joint
- **mud** — a term often used to describe the joint compound used to finish drywall
- **OSHA** — Occupational Safety and Health Administration

- **outlet cutter** — tool used to cut out openings in drywall for electrical outlets; available with various size cutter heads
- **protractor** — instrument used to lay out angles
- **respirator** — device worn over mouth and nose to protect the respiratory tract
- **soapstone** — soft stone having a soapy feel; used for marking metal and masonry
- **spray pump** — equipment used to apply various types of spray-on thermal insulations
- **stilts** — equipment used by drywall workers to elevate them to the proper working height
- **taping machine (banjo)** — equipment used to apply tape and mud to drywall joints

OBJECTIVE 2

From alternatives, choose the proper care and safety guidelines for the use of hand and power tools.

- Hand tools
  - Always follow OSHA rules and regulations.
  - Use the correct tool for the job.
  - Inspect tools frequently to make sure they are in good condition.
  - Keep tools sharp.
  - Keep tools clean.
  - Repair broken or damaged tools promptly.
  - Dispose of broken or damaged tools that cannot be repaired.

- Store tools properly when not in use.

  EXAMPLES: Do not carry tools in your pockets; do not place tools where they can roll off; protect cutting edges; lightly oil tools before storing; store tools in dry place.

- Stay alert when using tools.
- Wear personal protection equipment when necessary.

- Power tools and equipment
  - Always follow OSHA rules and regulations.
  - Keep tools clean and in good working condition.
  - Use GFCI equipped circuits or other assured grounding system to power AC powered tools. The GFCI circuit must be placed at the source of AC power.
  - Follow manufacturer's maintenance procedures.
  - Protect cutting edges.
  - Keep all tool accessories, such as blades and bits, sharp.
  - Always use the appropriate blade for the arbor size.
  - Report any unusual noises, sounds, or vibrations to your instructor or supervisor.
  - Inspect tools and accessories regularly. Ensure all safety devices/shields are in place.
  - Keep tools in their proper place when not in use.
  - Use the proper blade for the job being done.
  - Do not attempt to operate any power tool before being checked out by instructor on that particular tool. Use of some tools require operator certification.

- Always wear eye protection and hard hat when operating all power tools.
- Wear face protection when necessary.
- Wear proper respirator when necessary.
- Wear appropriate clothing for job being done.

- Ladder safety
  - Fully spread and lock stepladders before using.
  - **Do not** use ladders that are **not** equipped with safety shoes.
  - **Never** overreach from a ladder.
  - **Never** ascend to the top step of a ladder.
  - **Never** use a ladder in a horizontal position.
  - **Do not** climb a ladder that is occupied by someone else.
  - **Never** use a metal ladder when there is any possibility of contact with electrical wires or conductors.
  - Place ladders with approximately one-quarter of their support length away from vertical plane of top support, and extend ladders at least 3 feet above top support.
  - Do not carry a load up a ladder. Ascend the ladder and pull the load up with a rope.
  - Do not exceed the weight limits of the ladder.
  - Inspect ladders before each use.
- Scaffold safety
  - Observe OSHA regulations.
  - Read and follow all manufacturer's instructions.

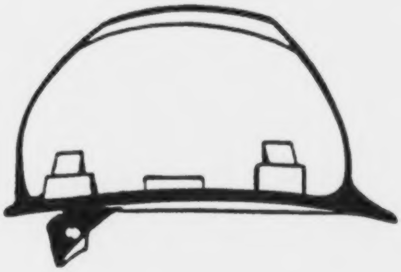
- Use only approved scaffolding.
- Inspect scaffolds regularly.
- Install all braces and accessories according to manufacturer's recommendations.
- Install anchors and guy wires on freestanding scaffolds as required.
- Be careful not to overload scaffolds.
- Ask an experienced co-worker, instructor, or your supervisor to inspect an assembled scaffold *before* use.

OBJECTIVE 3 **Given drawings, identify hand tools used for the installation of interior systems.** (Assignment Sheet 1)

- Personal protection equipment
  - Hard hat

    NOTE: Head protection is required on all jobs and is used to protect individuals from possible head injury.

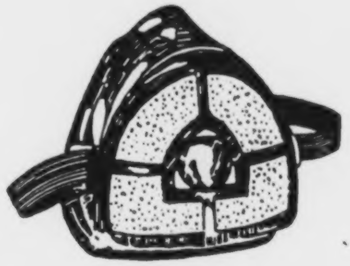
FIGURE 1



— Respirators

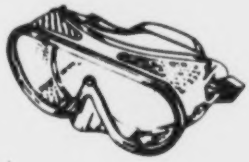
NOTE: Clean, appropriate respirators will be provided by employer as needed.

FIGURE 2



— Safety goggles

FIGURE 3



— Back braces

FIGURE 4

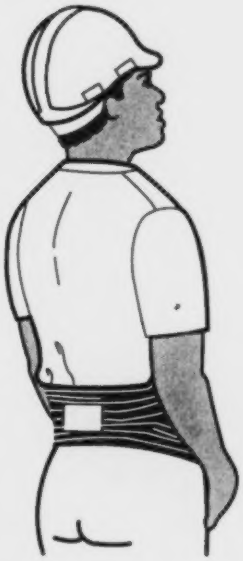
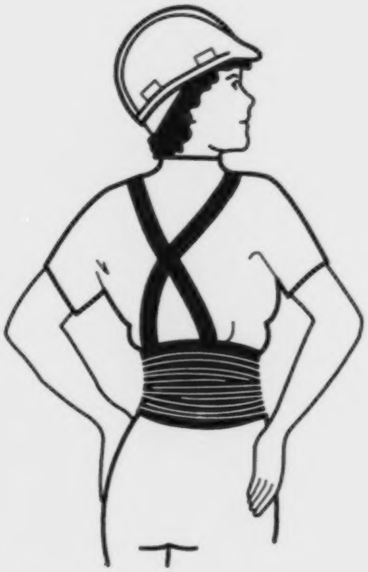
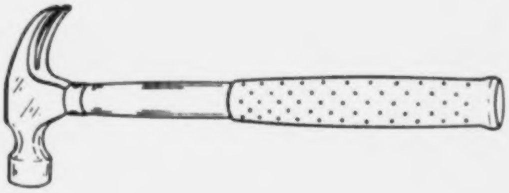


FIGURE 5



- Hammers
    - curved-claw hammer — used to drive and pull nails

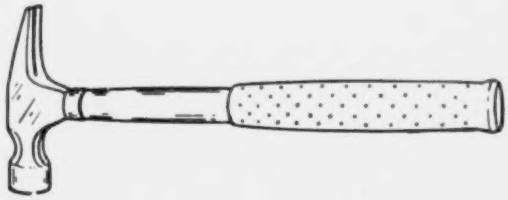
FIGURE 6



NOTE: Curved-claw hammers weigh from 13 ounces to 20 ounces; handles are made of wood, fiberglass, or steel.

- straight-claw hammer — used to drive nails, pull nails, dismantle and wreck

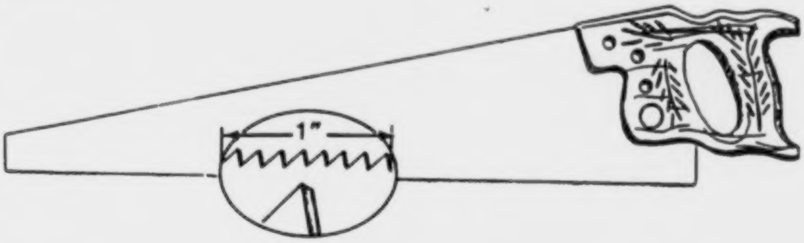
FIGURE 7



NOTE: Straight-claw hammers weigh from 16 ounces to 21 ounces; straight-claw hammers weighing from 22 ounces to 28 ounces are called *framing hammers.*

- Handsaws
  - crosscut saw — used to cut across the grain of wood

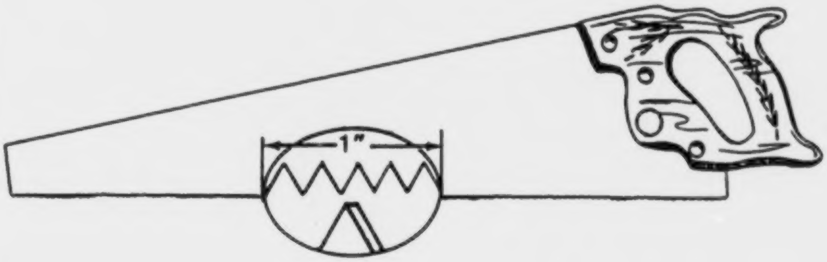
FIGURE 8



NOTE: Crosscut saws come in lengths of 20 inches to 26 inches with four to twelve points per inch; teeth are filed at an angle across the face.

  - ripsaw — used to cut with the grain of wood

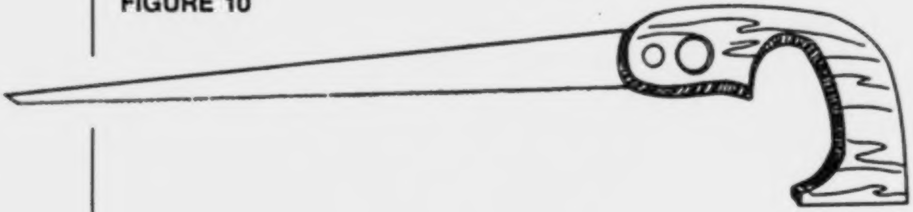
FIGURE 9



NOTE: Ripsaws come in lengths of 20 inches to 28 inches with five to seven points per inch; teeth are filed square across the face.

- compass saw (keyhole saw) — used to cut inside corners, curves, circles, and frets

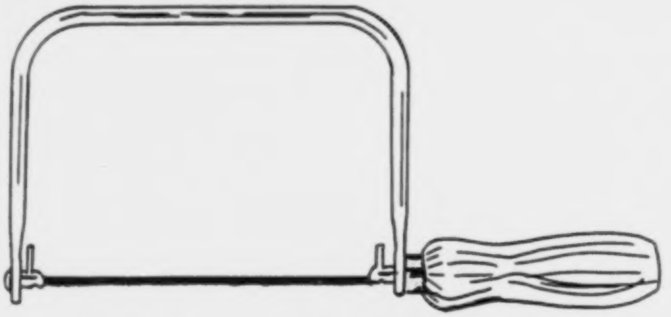
FIGURE 10



NOTE: Compass saws come in length of 10 to 14 inches; their tapered blade can be reversed or set in various positions; some have a replaceable blade.

- coping saw — used to cut curves and to shape ends of molding and trim for joints

FIGURE 11

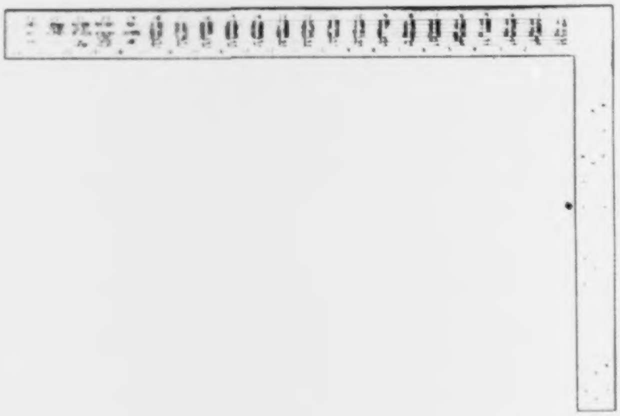


NOTE: The coping saw's U-shaped frame permits cuts as deep as 6¾ inches; blade is replaceable.

118

- Squares
  - — framing square (rafter square) — used in general framing to lay out walls, partitions, rafters, braces, and stairs

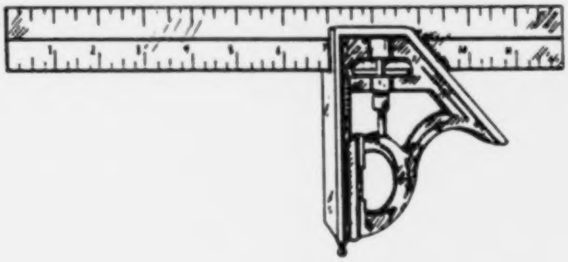
FIGURE 12



NOTE: Framing squares have a 24-inch-by-2-inch calibrated blade and a 16-inch-by 1½-inch calibrated tongue. Rafter and brace tables are stamped on one blade.

— combination square — used to check square and to mark 45-degree miters

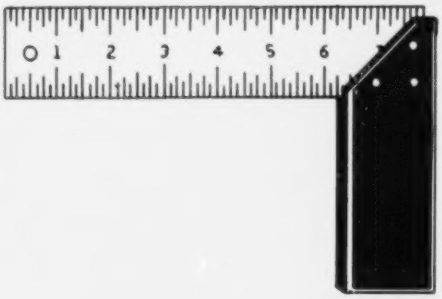
FIGURE 13



NOTE: Combination squares have a 12-inch blade and an adjustable handle that contains a level vial and a scribe (scratch awl). Handles are made with a 45-degree and a 90-degree side.

— try square — used to measure and check 45 and 90-degree angles

FIGURE 14



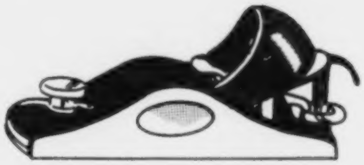
NOTE: Try squares have a 6-inch to 12-inch blade that is graduated every ⅛ inch; their stationary handles comes in lengths of 4⅜ inches to 8 inches.

- Planes

  NOTE: Planes are used to remove excess wood from surfaces and leave them smooth and straight. Planes come in a variety of sizes. Plane frames are made of wood or metal; their blades are made of steel and called a plane iron. The two general types of planes are the hand-operated block planes and the bench planes.

  — block plane — used to plane small pieces, edges, joint surfaces, and grain or cross grain when a small amount of change is required

FIGURE 15

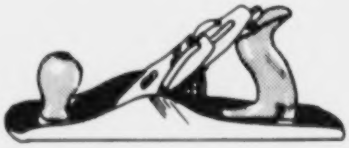


NOTE: Block planes come in 4-inch to 7-inch lengths and 1⅜-inch to 1⅝-inch widths. Some block planes are fully adjustable, including the mouth; blades may be set from 12 degrees to 21 degrees.

— bench planes

1. jack plane — used to plane rough work to produce a fairly smooth surface

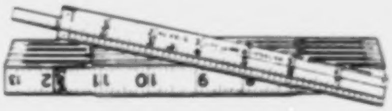
FIGURE 16



NOTE: Jack planes are 14 inches long and 2 inches wide; they have a fully adjustable blade and a hardwood handle and knob.

- Measuring instruments
  - — folding rule — used to make accurate inside measurements

FIGURE 17



NOTE: Folding rules come in 6-foot or 8-foot lengths.

  - — flexible steel tape — used to measure irregular as well as regular shapes, and to make accurate inside measurements

FIGURE 18

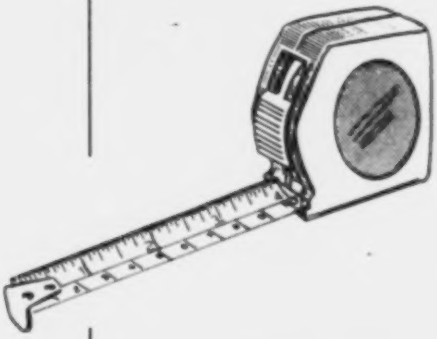
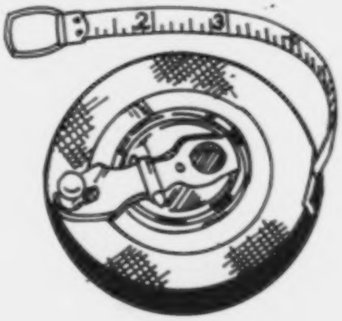


FIGURE 19



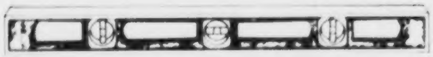
NOTE: Flexible steel tapes slide into a metal case. Most short tapes come in 6-foot to 25-foot lengths; long tapes come in 50-foot to 100-foot lengths. Both types of flexible steel tapes have a hook or loop on the end adjusted to true zero.

- Levels

NOTE: Levels are used to check true horizontal and vertical surfaces of objects.

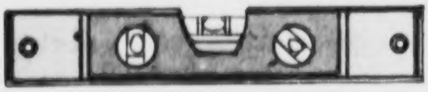
- Spirit level

FIGURE 20



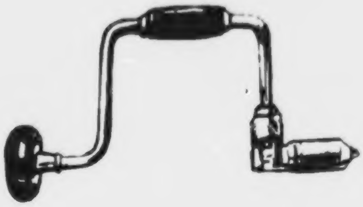
- Torpedo level

FIGURE 21



- Boring/Drilling tools
  - Hand brace

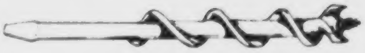
FIGURE 22



NOTE: Hand braces are used to hold and operate bits.

— Auger bit

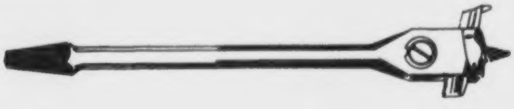
FIGURE 23



NOTE: Auger bits come with a single-twist or a double-twist; sizes range from ¼ inch (No. 4) to 1 inch (No. 16).

— Expansive bit

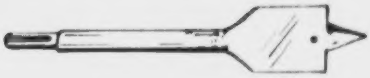
FIGURE 24



NOTE: Expansive bits hold cutters of different sizes. One cutter will bore holes in the 1-inch to 2-inch range; a second cutter will bore holes in the 2-inch to 3-inch range.

— Power bit (flat bit, speed bit)

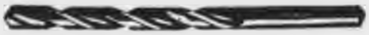
FIGURE 25



NOTE: Power bits are available in sizes ranging from ¼ inch to 1½ inches and come in ¹⁄₁₆-inch increments. They have become increasingly popular because the shank is ¼ inch on all sizes.

— Twist drill (spiral drill)

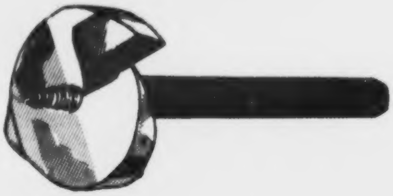
FIGURE 26



NOTE: Twist drills are used to drill small holes for nails, screws, etc. Most twist-drill sets range from 1/64 to 1/2 inch.

— Lockset bit

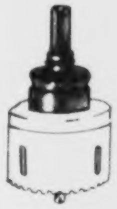
FIGURE 27



NOTE: Lockset bits are used to make cuts for installing a lock in a door.

— Hole saw

FIGURE 28



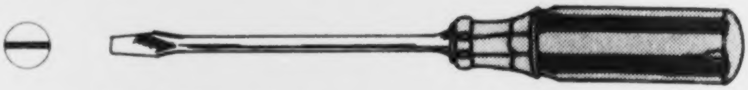
NOTE: Hole saws consist of a hollow cylinder with teeth around its edge; they are used for cutting round holes.

- Screwdrivers

NOTE: Select a screwdriver that is shaped to fit the screw slot properly and is ground to the correct size. If the screwdriver is too large, it will damage the screw head. If the screwdriver is too small, it will be damaged.

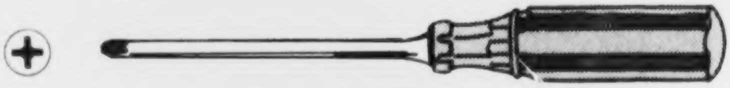
— Standard screwdriver (flat tip or flat blade screwdriver)

FIGURE 29



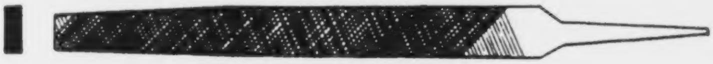
— Phillips screwdriver

FIGURE 30



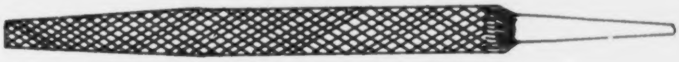
- Flat

FIGURE 31



- Woodrasp — Used to shape and finish wood

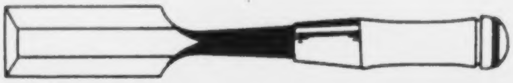
FIGURE 32



- Chisels

  - Wood chisel

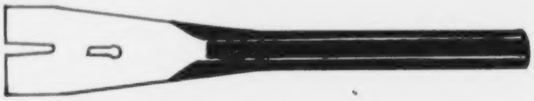
FIGURE 33



NOTE: Wood chisels come in blade sizes of ¼-inch to 2 inches in ¼-inch increments.

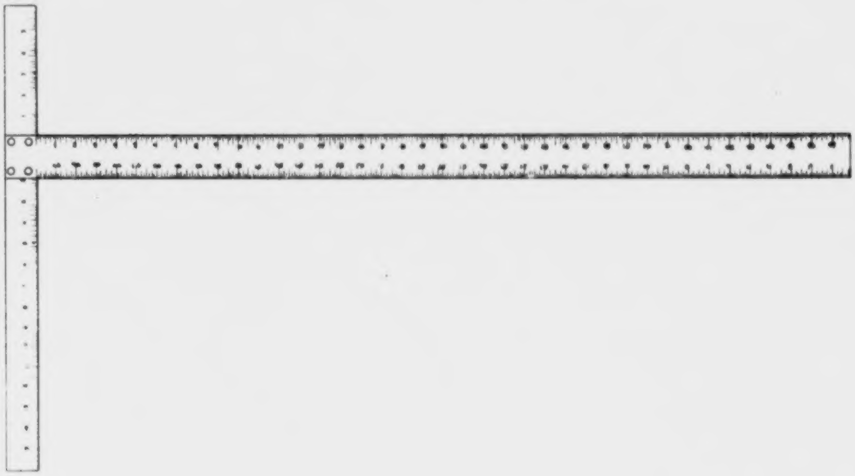
  - Ripping chisel

FIGURE 34



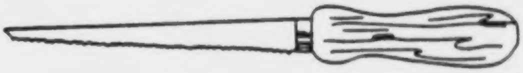
- Drywall tools
  - — Drywall T-square

FIGURE 35



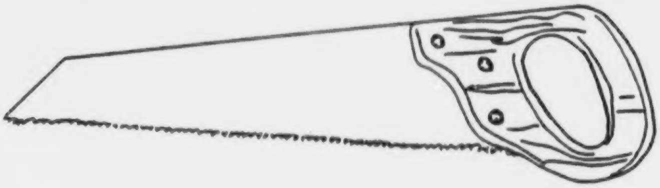
  - — Utility saw

FIGURE 36



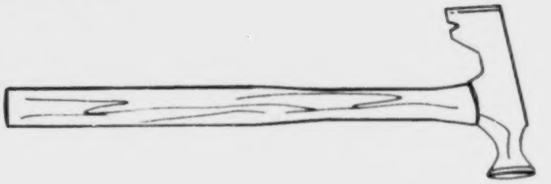
  - — Drywall saw

FIGURE 37



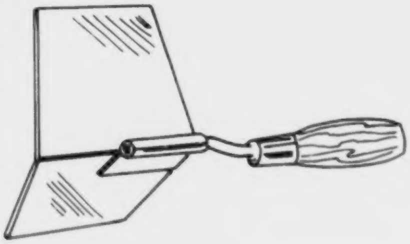
— Drywall hammer/hatchet

FIGURE 38



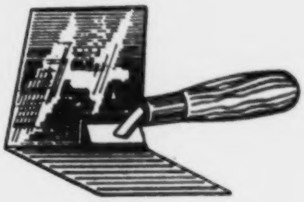
— Outside-corner tool

FIGURE 39



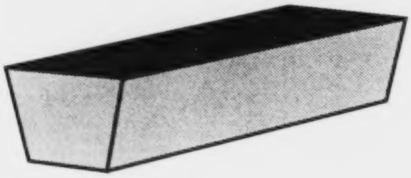
— Inside-corner tool

FIGURE 40



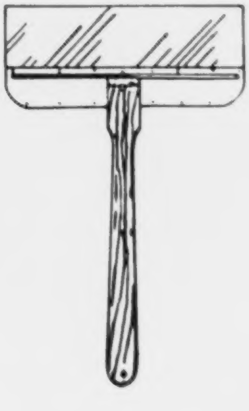
— Mud pan

FIGURE 41



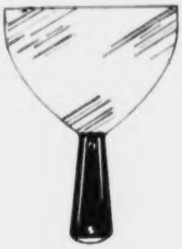
— Taping knife

FIGURE 42



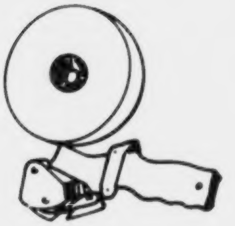
— Elastic knife

FIGURE 43



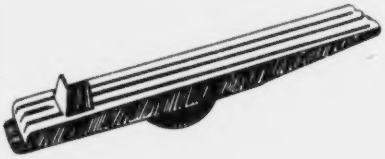
— Taping machine (banjo)

FIGURE 44



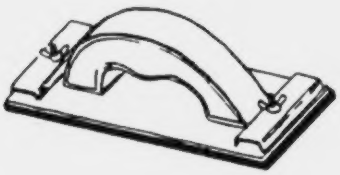
— Drywall lifter

FIGURE 45



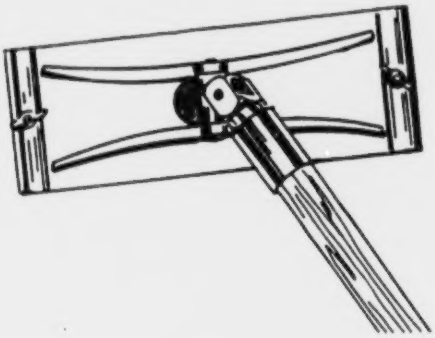
— Handsander

FIGURE 46



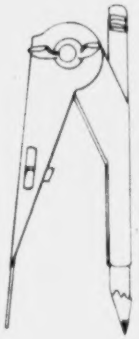
- Long-handled sander

FIGURE 47



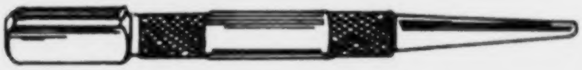
- Miscellaneous hand tools
  - Scribe — Used to lay out an arc or circle, to step off measurements, to divide distances along a straight line and to scribe lines on materials

FIGURE 48
Scribe



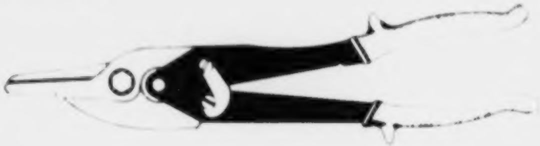
- Nail set — Used to sink a nail head below the surface

FIGURE 49



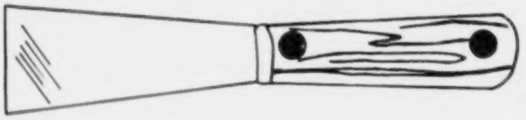
- Tin snips — Used to cut lightweight metal

FIGURE 50



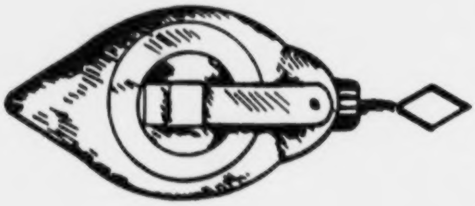
- Putty knife — Used to scrape and apply putty and wood fillers

FIGURE 51



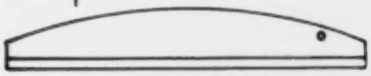
- Chalk box and line

FIGURE 52



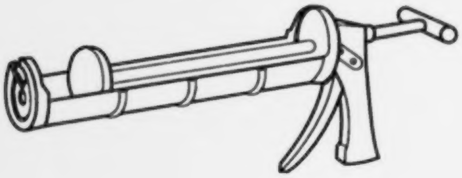
— Straightedge

FIGURE 53



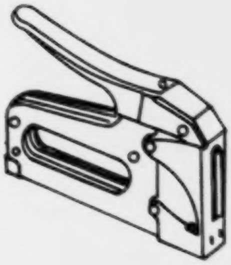
— Caulking gun

FIGURE 54



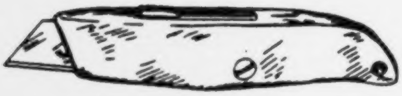
— Staple gun

FIGURE 55



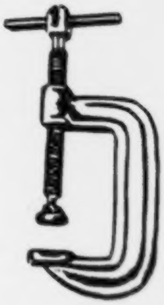
— Utility knife

FIGURE 56



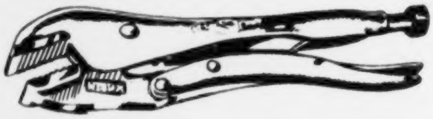
— "C" clamp

FIGURE 57



— Vise grips

FIGURE 58



- Ladders

  Ladders may be wood, metal, or fiberglass. Maintain caution when using metal ladders near any electrical wires or equipment.

  1. Stepladder
  2. Extension
  3. Single, straight

FIGURE 59

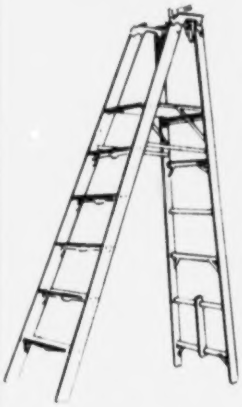


FIGURE 60

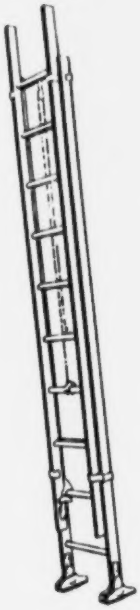
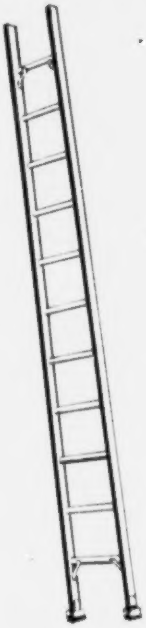


FIGURE 61

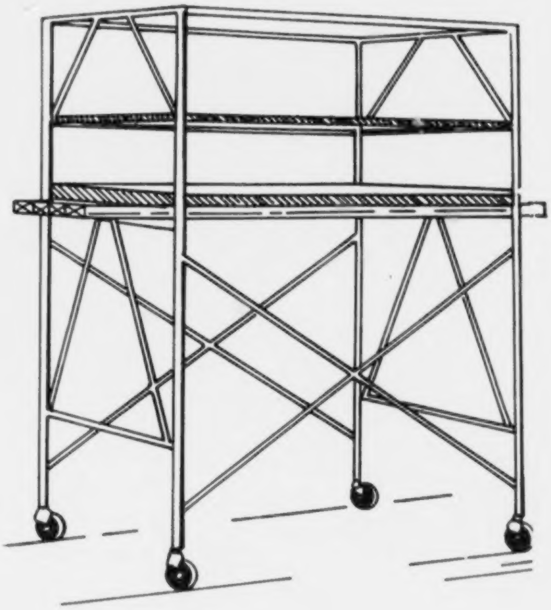


- Scaffolds

  Scaffolds may be wood, steel, or aluminum; they may be prefabricated or built at the job site.

  — Prefabricated

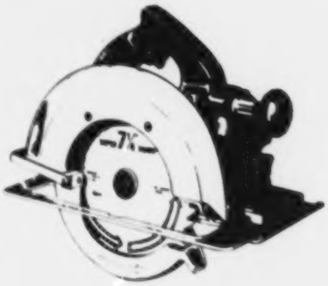
FIGURE 62



OBJECTIVE 4 **Given drawings, identify power tools used for the installation of interior systems.** (Assignment Sheet 2)

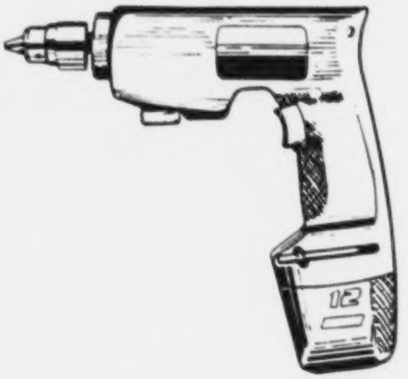
- Circular saw

FIGURE 63



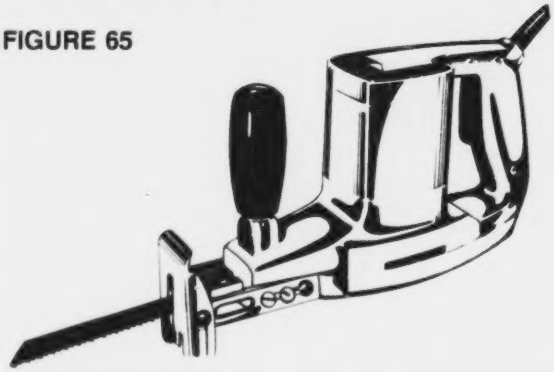
- ¼-inch hand drill

FIGURE 64



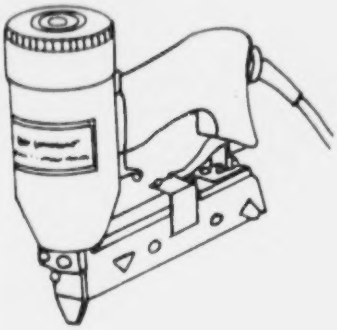
- Reciprocating saw

FIGURE 65



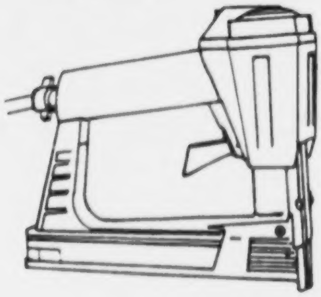
- Electric stapler

FIGURE 66



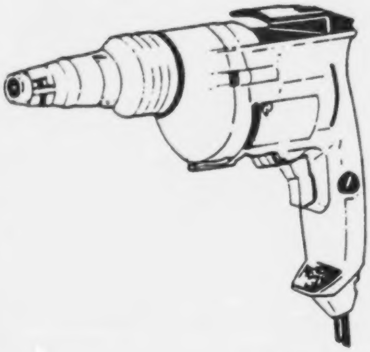
- Pneumatic stapler

FIGURE 67



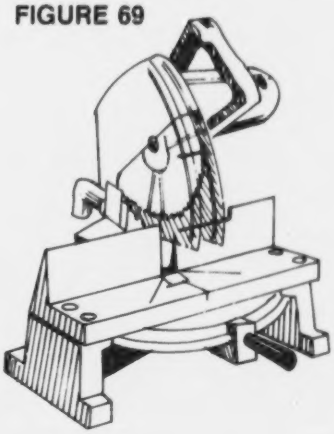
- Screw gun

FIGURE 68



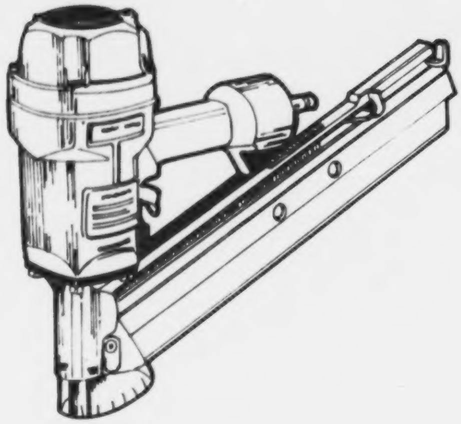
- Power miter

FIGURE 69



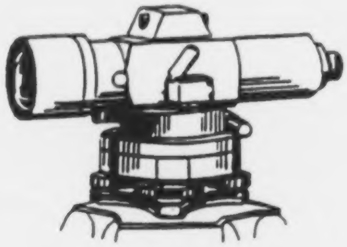
- Pneumatic nailer

FIGURE 70



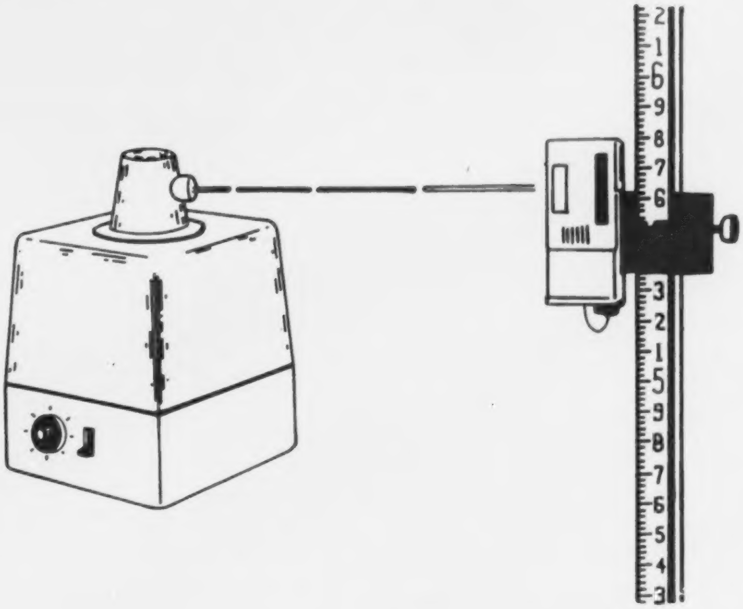
- Miscellaneous equipment
  - Automatic or self leveling level

FIGURE 71



— Rotating laser-beam instrument

FIGURE 72


2
1
0
9
8
7
6
3
2
1
5
9
8
7
6
5
4
3

— Power lift

FIGURE 73

ASSIGNMENT SHEET 1

INTERIOR SYSTEMS TOOLS

A 2

Name ________________________ Score ________

OBJECTIVE 3

Given drawings, identify hand tools used for the installation of interior systems.

INTRODUCTION

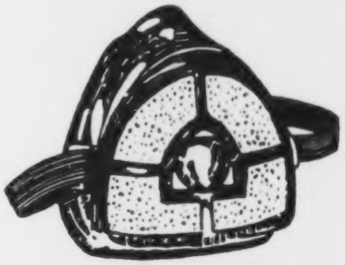
The installation of interior systems requires that the finish carpenter be able to identify many common hand tools used in construction. Practice identifying common hand tools by completing this assignment sheet.

INSTRUCTIONS

Match the hand tools by writing in their titles below the appropriate drawing.

Functional Reading
- Use content area vocabulary

respirator
hard hat
drywall hammer/hatchet
scaffold
"C" clamp
staple gun
chalk box and lines
caulking gun
ripsaw
try square
hand sander
taping knife
drywall lifter
framing square
wallboard saw
outside-corner tool
Phillips screwdriver
putty knife
block plane
lockset bit
expansion bit
steel tape measure
curved-claw hammer
flat file
safety goggles



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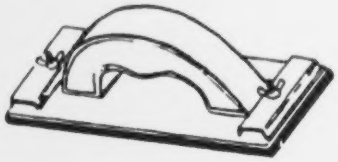

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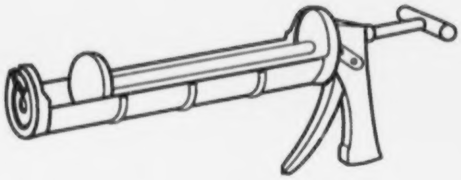

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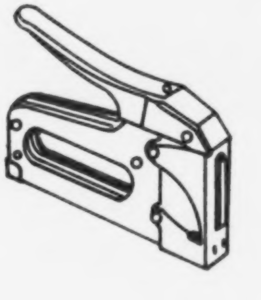

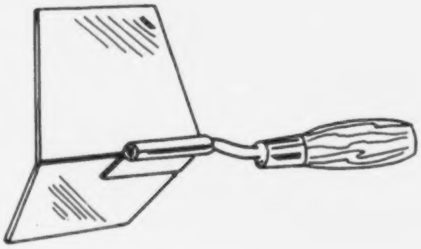

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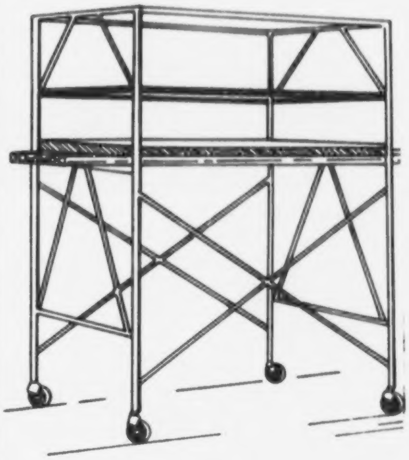

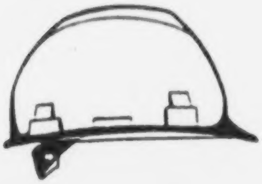

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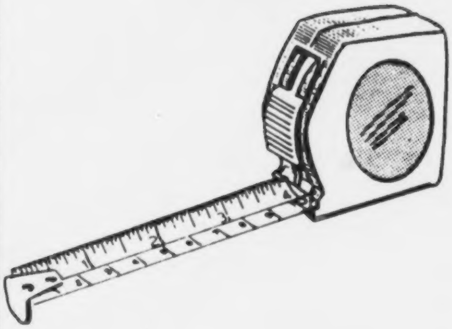

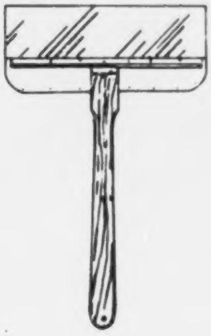

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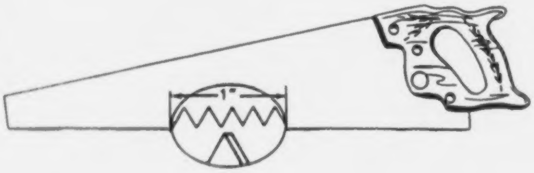

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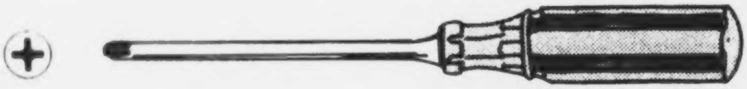

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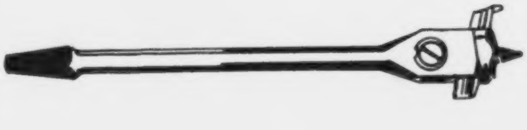

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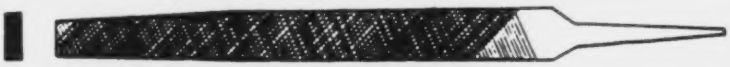

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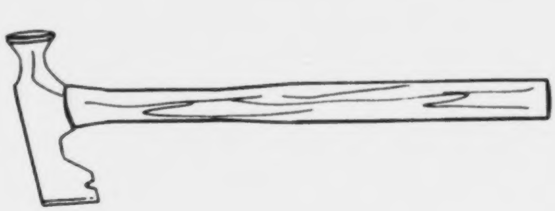

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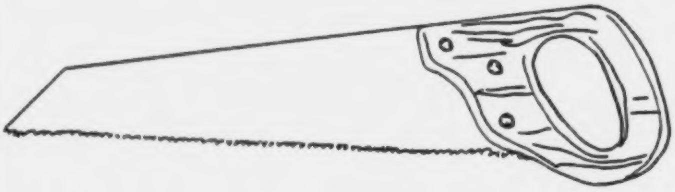

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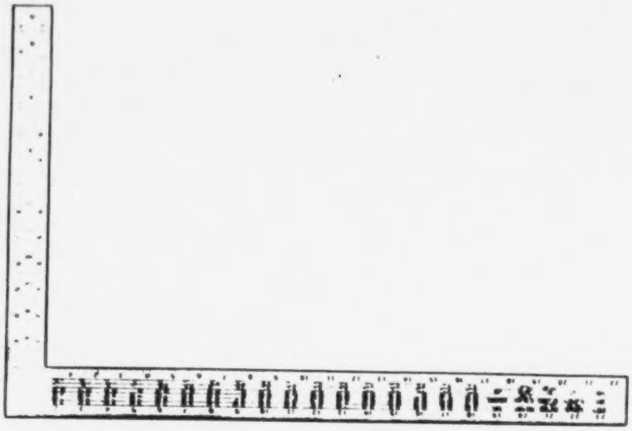

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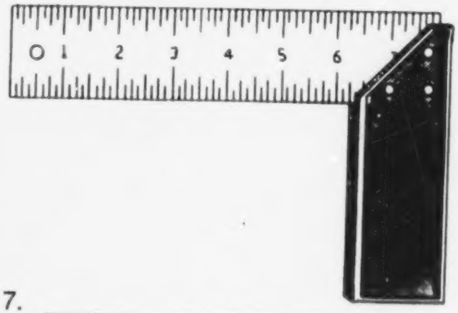

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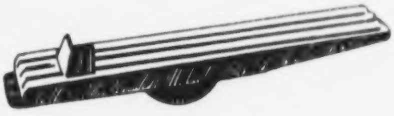

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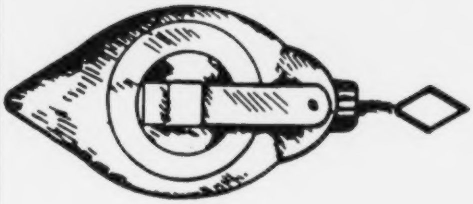

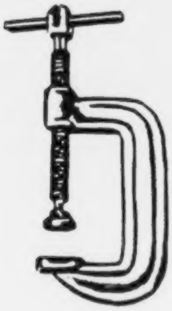

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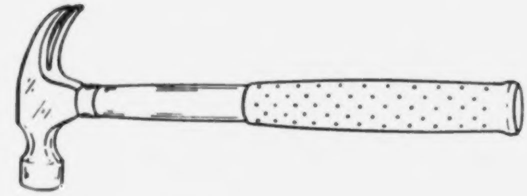

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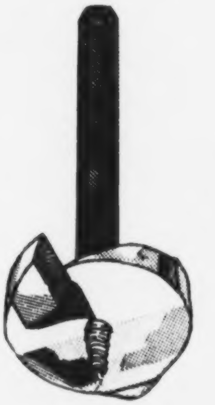

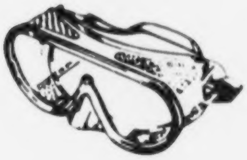

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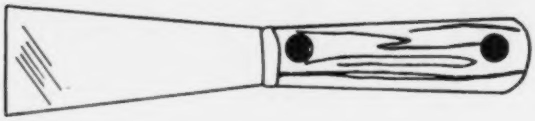

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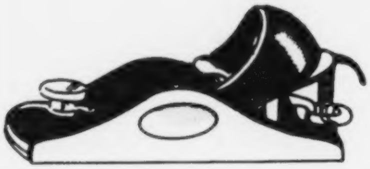


25. ______________________

ASSIGNMENT SHEET 2

INTERIOR SYSTEMS TOOLS

A 2

Name ______________________________ Score __________

OBJECTIVE 4

Given drawings, identify power tools used for the installation of interior systems.

INTRODUCTION

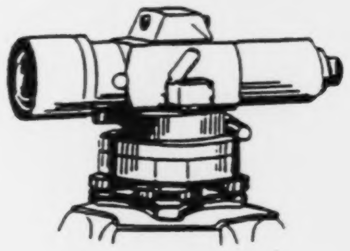
This assignment sheet will provide practice in identifying common power tools and equipment used during the installation of interior systems.

INSTRUCTIONS

Match the power tool or equipment by writing in their titles below the appropriate drawing.

Functional Reading
- Use content area vocabulary

power lift
rotating laser-beam instrument
pneumatic stapler
¼ inch hand drill
automatic or self leveling level
electric stapler
reciprocating saw
circular saw
pneumatic nailer



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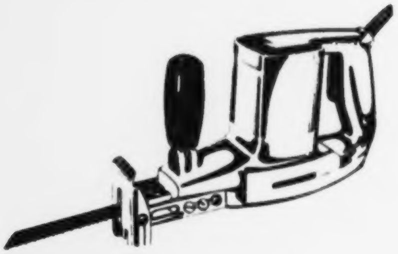
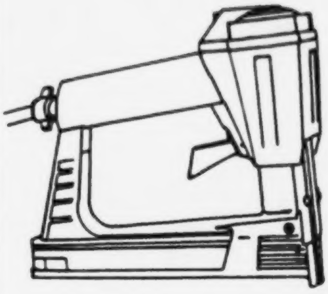
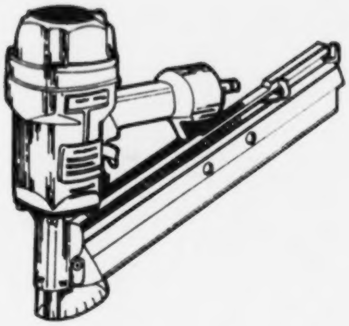


2. ____________________



3. ______________________



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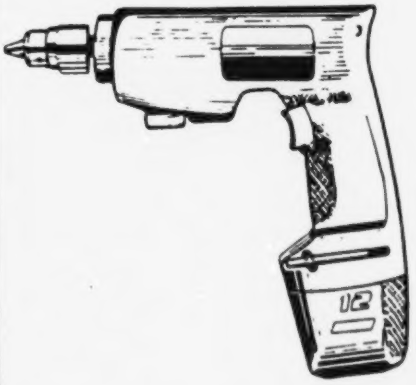

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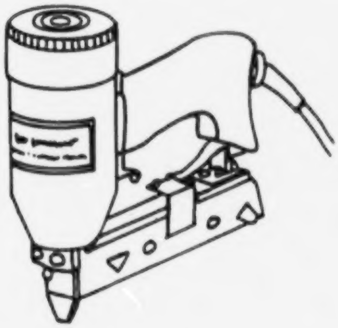

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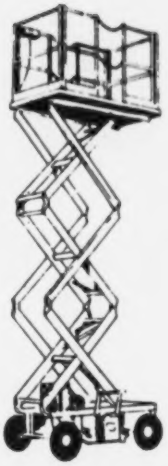

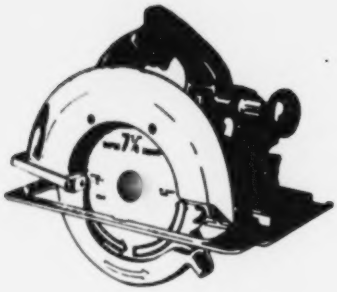

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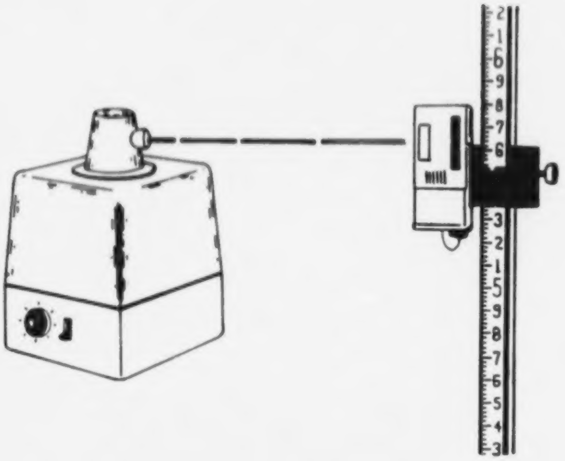


9. ____________________

ASSIGNMENT SHEET 1

1. respirator
2. hand sander
3. caulking gun
4. staple gun
5. outside-corner tool
6. scaffold
7. hard hat
8. steel tape measure
9. taping knife
10. ripsaw
11. Phillips screwdriver
12. expansion bit
13. flat file
14. drywall hammer/hatchet
15. wallboard saw
16. framing square
17. try square
18. drywall lifter
19. chalk box and line
20. "C" clamp
21. curved-claw hammer
22. lockset bit
23. safety goggles
24. putty knife
25. block plane

ASSIGNMENT SHEET 2

1. automatic or self leveling level
2. reciprocating saw
3. pneumatic stapler
4. pneumatic nailer
5. ¼ inch hand drill
6. electric stapler
7. power lift
8. circular saw
9. rotating laser-beam instrument

JOB SHEET 1

INTERIOR SYSTEMS TOOLS A 2

OBJECTIVE 5 **Use a hammer properly.**

INTRODUCTION

The hammer is one of the most used tools in carpentry. This exercise will describe how to use a claw hammer to drive and pull nails.

EQUIPMENT AND SUPPLIES

- Hard hat and goggles
- Claw hammer
- Nails
- Two each 2×4 blocks

PROCEDURE

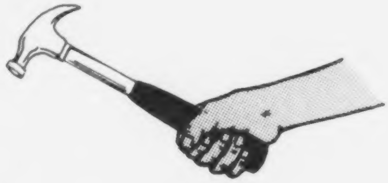
- Driving nails Yes No

1. Put on safety equipment. _____ _____
2. Grasp hammer handle firmly near the end (Figure 74). _____ _____

Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

FIGURE 74

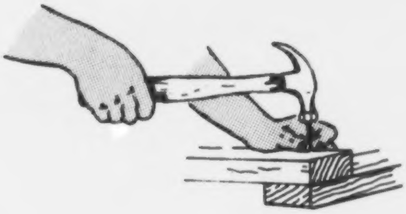


3. Place one 2×4 on top of another 2×4. _____ _____

Yes No

4. Rest face of hammer on the nail held in other hand (Figure 75). _____ _____

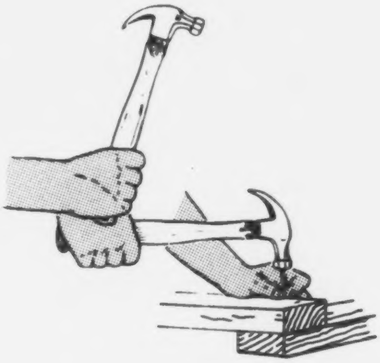
FIGURE 75



5. Raise the head of hammer and give a light tap to start nail and to determine the aim (Figure 76). _____ _____

NOTE: This maneuver is accomplished through the wrist, elbow, and shoulder with one or all being used according to the strength of the blow to be struck.

FIGURE 76

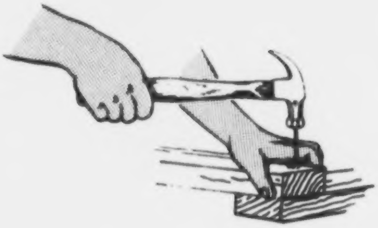


Yes No

6. Strike the nail squarely to avoid marring the wood and bending the nail (Figure 77). _____ _____

   Keep face of hammer clean to avoid its slipping off the nail.

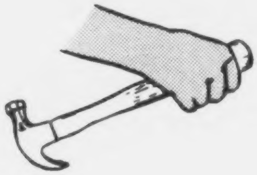
FIGURE 77



- Pulling nails

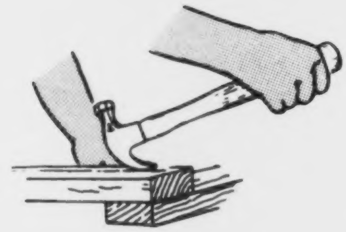
  1. Grasp hammer handle firmly near the end, just opposite from the grasp used for driving nails (Figure 78) _____ _____

FIGURE 78



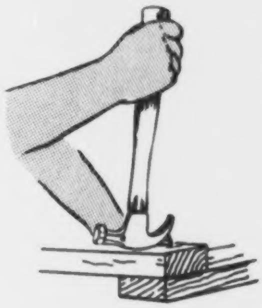
	Yes	No
2. Slip claw of the hammer under the nail head and apply pressure (Figure 79).	_____	_____

FIGURE 79



	Yes	No
3. Continue applying pressure by pulling back on the handle until the handle is nearly vertical (Figure 80).	_____	_____

FIGURE 80



	Yes	No
4. This concludes this job sheet. Ask your instructor to evaluate your work.	____	____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Used safety equipment	4	3	2	1
Grasped hammer by end	4	3	2	1
Started nail properly	4	3	2	1
Avoided marring of wood	4	3	2	1
Drove nail straight	4	3	2	1
Pulled nail properly	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 2 — INTERIOR SYSTEMS TOOLS — A 2

OBJECTIVE 6

Use a handsaw.

INTRODUCTION

This exercise allows you to practice using a hand saw to cross cut lumber (across the wood grain).

EQUIPMENT AND SUPPLIES

- Hard hat and goggles
- Cross cut handsaw
- Pencil
- Saw horses (1 pair)
- 2×4 approximately 4′ long
- Square

PROCEDURE

- Cross cutting lumber

	Yes	No
1. Put on your safety equipment.	_____	_____
2. Using a square, mark a line across one end of a 2×4.	_____	_____
3. Firmly grasp the cross cut handsaw.	_____	_____

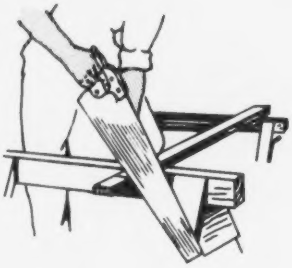
Functional Reading Skills
- Follow written instructions

Job Acquisition/ Development Skills
- Master specific job task/procedure

General Science Skills
- Use scientific instruments

	Yes	No
4. Place one knee on 2×4 to hold it firmly in place; align saw blade with mark (Figure 81).	____	____

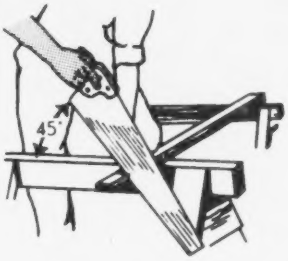
FIGURE 81



	Yes	No
5. Position saw at about 45-degree angle between the sawhorse and the 2×4 and start the cut by drawing the saw backward, then forward (Figure 82).	____	____

NOTE: Always cut on the waste side of the mark. This will ensure the lumber to be used will be the correct length.

FIGURE 82



	Yes	No
6. Hold blade of saw square to the stock, and steady the blade at the mark with your thumb.		
7. Continue these procedures until the cut is made.		
8. Have your instructor check your work.		
9. Clean up work area, and put away tools and materials.		

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Safety equipment used	4	3	2	1
Lumber cut squarely	4	3	2	1
Saw held at correct angle	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 3

INTERIOR SYSTEMS TOOLS

A 2

OBJECTIVE 7

Use a framing square and rule to lay out a corner.

INTRODUCTION

Pencil, rule, and square; these three tools are probably the most basic tools that a carpenter will ever use, yet they are probably the most important. More mistakes have been made with these three tools than any other three tools, which is the reason for learning to use these tools properly. Part of that learning is to recheck your work very carefully.

EQUIPMENT AND SUPPLIES

- Framing square
- Steel tape measure
- Pencil
- Chalk line

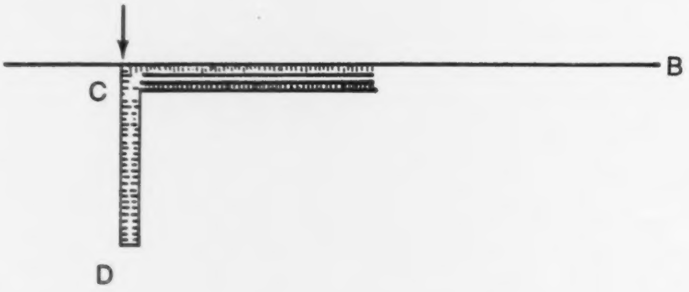
PROCEDURE

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Apply geometry principles

	Yes	No
1. Place framing square on the floor at Point C to square off a line (Figure 83).	_____	_____
NOTE: Instructor will establish Point C.		
2. Mark line CD along edge of framing square.	_____	_____

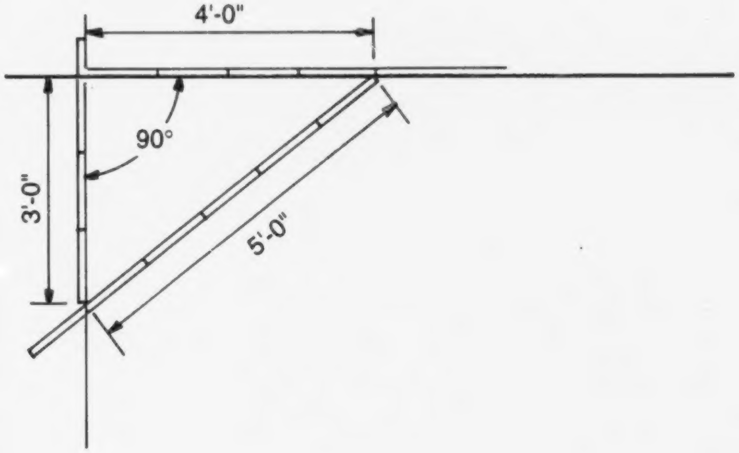
FIGURE 83



Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
3. Snap a chalkline from Point C along line CD to extend several feet past point D.	____	____
4. Use rule and 3-4-5 method to check square of corner.	____	____

FIGURE 84



	Yes	No
5. Recheck work.	____	____
6. Have your instructor check your work.	____	____
7. Clean work area; put away tools and equipment.	____	____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Measurements correct	4	3	2	1
Layout is square on floor	4	3	2	1
Time standard for a 4 rating is 15 minutes or less	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required

2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill

1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 8

Use a level.

INTRODUCTION

Levels are very delicate instruments and must be handled carefully to ensure accuracy. Levels should be checked for accuracy periodically and before use, especially if the instrument has been dropped or jarred.

EQUIPMENT AND SUPPLIES

- Four-foot spirit level
- Folding rule or steel tape
- Pencil
- Straightedge
- Vertical and horizontal work surface
- Level surface

PROCEDURE

Functional Reading Skills
- Follow written instructions

Data Analysis and Display Skills
- Interpret graphs

	Yes	No
1. Check level for accuracy.		
a. Set base of level on flat, horizontal surface.	_____	_____
b. Check bubble position in horizontal vial.	_____	_____
c. Adjust surface or location of level until bubble is centered; mark position on surface.	_____	_____

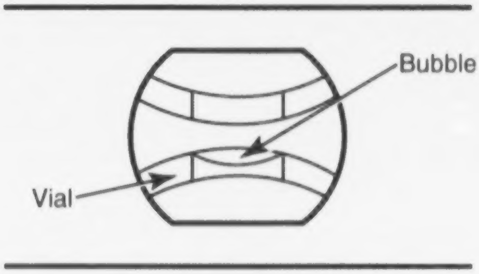
NOTE: On a level surface, the bubble will lie evenly positioned between the lines on the vial. See Figure 85.

Job Acquisition/ Development Skills

- Master specific job task/procedure
- Complete job-related applications
- Practice good work habits/attitudes

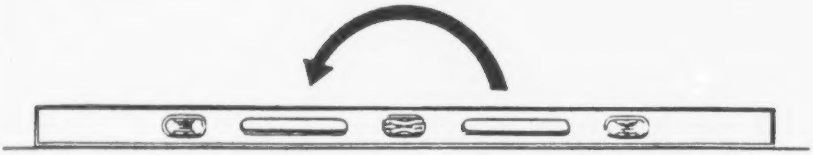
Yes No

FIGURE 85



d. Rotate the level end for end and position it on the exact location; use the bottom bubble. ____ ____

FIGURE 86



e. Check bubble position in the horizontal vial. ____ ____

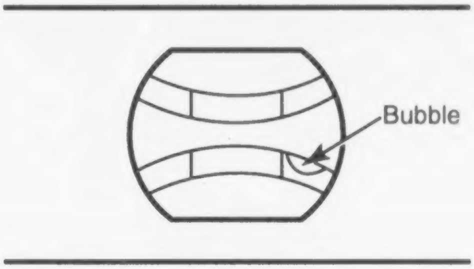
NOTE: The bubble will be centered from this side also if the level is accurate.

f. Replace or repair level as necessary. ____ ____

	Yes	No
2. Level a surface.		
a. Visually check surface for irregularities and foreign matter such as dirt.	____	____
b. Clean or replace surface as necessary.	____	____
c. Set base of level carefully and squarely on surface.	____	____
d. Check bubble position.	____	____

NOTE: The bubble will be displaced toward the high end of the level (Figure 87).

FIGURE 87



	Yes	No
e. Adjust surface as necessary.	____	____
f. Take additional readings to level surface as required.	____	____

NOTE: Many factors, such as the type of surface and the material being used, affect the number of readings that are required.

PROCEDURE FOR PLUMBING

Plumb a vertical surface.	Yes	No
1. Check level for accuracy.		
a. Place base of level against flat, vertical surface (See Figure 88).	_____	_____
b. Check bubble position in upper horizontal vial.	_____	_____
c. Adjust surface or location of level until bubble is centered; mark position on surface.	_____	_____

FIGURE 88

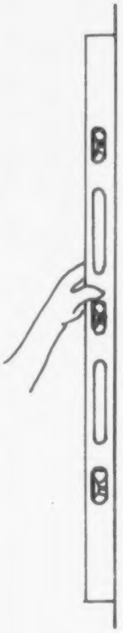
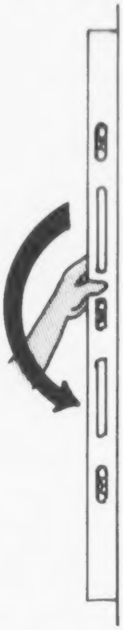


FIGURE 89



Yes No

d. Rotate the level, end for end, and position it on the exact location of the bubble-centered reading (Figure 89). _____ _____

e. Check bubble position in the upper horizonal vial. _____ _____

NOTE: The bubble will be centered at this end also if level is accurate.

2. Plumb a surface.

a. Visually check surface for irregularities and foreign matter such as dirt. _____ _____

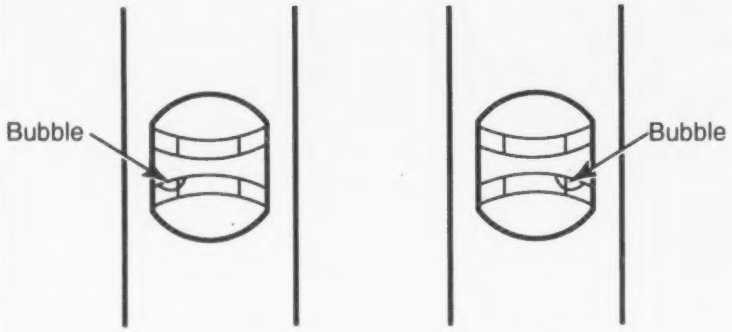
b. Clean or replace surface as necessary. _____ _____

c. Place base of level carefully and squarely against surface. _____ _____

d. Check bubble position in upper vial. _____ _____

NOTE: The bubble will move toward one end of the vial if the surface is not plumb. To plumb the surface, you just adjust it in the direction of bubble displacement. See Figure 90.

FIGURE 90



Surface Slants /   Surface Slants \

	Yes	No
e. Adjust surface as necessary.		
f. Take additional readings to plumb as required.		
3. Have your instructor check your work.		
4. Clean work area; put away tools and equipment.		

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Accuracy of level verified	4	3	2	1
Surface is level	4	3	2	1
Vertical surface is plumb	4	3	2	1
Time standard for a 4 rating is 10 minutes or less	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 5 — INTERIOR SYSTEMS TOOLS — A 2

OBJECTIVE 9

Perform a ripping operation with a circular saw.

INTRODUCTION

This exercise allows you to improve your use of safety equipment and safe work habits. The circular saw is an important tool in carpentry, and you should strive to use it safely and effectively.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Circular saw
- Folding rule or tape
- Pencil
- Sawhorse or other solid support
- Five 6″×12″ pieces of ¾-inch plywood

PROCEDURE

CIRCULAR SAW	Yes	No
1. Put on safety goggles and hard hat.		
2. Check to see that the automatic blade guide is free and retractable.		
3. Install a rip blade on the saw and adjust it to the proper depth.		
4. Plug the saw into the power source, making sure the saw is grounded.		
5. Secure the stock on a solid support.		
6. Check to be sure the blade is clear of the stock before starting the saw.		
7. Check with your instructor for approval before starting the saw.		

Functional Reading Skills
- Follow written instructions

Math Application Skills
- Use English and metric measures

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

	Yes	No
8. Start the saw and let it gain maximum speed.	_____	_____
9. Advance the saw slowly but firmly into stock.	_____	_____
10. Turn off the saw immediately after the cut is completed.	_____	_____
11. Check to be sure the blade guard has returned to its proper position.	_____	_____
12. After the blade has stopped turning, lay the saw on its base.	_____	_____
13. Remove the stock, and discard scrap in the proper receptacle.	_____	_____
14. Unplug the saw from the power source.	_____	_____
15. Remove safety goggles and hard hat.	_____	_____
16. Clean your work area and put away tools.	_____	_____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS ____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Used safety equipment	4	3	2	1
Operated saw properly	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required

2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill

1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 10

Use a T-square and a utility knife to measure and cut drywall.

INTRODUCTION

Learning to safely measure and cut drywall can reduce wasted materials and increase your efficiency as a carpenter.

EQUIPMENT AND SUPPLIES

- Hard hat and goggles
- T-square
- Tape measure
- Pencil
- Utility knife
- Drywall sheets (4′ × 8′ × ½″)

PROCEDURE

- Measuring and layout of drywall.

	Yes	No
1. Put on safety equipment.	_____	_____
2. Place a sheet of drywall face up on a flat surface.	_____	_____
NOTE: After some practice, you may find it easier to mark and cut the drywall with it standing upright, leaning it against your legs for support.	_____	_____
3. Using a tape measure or T-square, measure the dimensions of the wall or ceiling to be covered.	_____	_____
4. Using the T-square, mark the measurements on the finished face of the drywall.	_____	_____

Functional Reading
- Follow written instructions

Functional Math
- Make measurements

Job Acquisition/ Development
- Master specific job task/procedure

	Yes	No
- Cutting drywall		
1. Use the T-square to guide the utility knife as you cut through the face paper.	_____	_____

CAUTION: Be sure to apply only enough pressure to cut through the drywall paper. Be careful to position your other hand and knees to prevent injuries from the knife blade.

	Yes	No
2. Break the drywall at the cut.	_____	_____
NOTE: A drywall saw will be necessary if you are *not* cutting the drywall sheet completely across or lengthwise in a straight line.		
3. Use a utility knife to cut the paper on the back side of the drywall.	_____	_____
4. Use a drywall rasp to smooth the cut edge, if necessary.	_____	_____
5. Ask your instructor/supervisor to evaluate your work.	_____	_____
6. Clean up area and put away equipment and supplies.	_____	_____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Drywall cut to proper dimensions (±⅛″)	4	3	2	1
Safety equipment used and precautions taken	4	3	2	1
Drywall edge smooth	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

WRITTEN TEST

INTERIOR SYSTEMS TOOLS

A 2

Name ______________________________ Score ________

OBJECTIVE 1

Given a list of terms associated with interior systems tools, match them to their correct definitions. Write in the letter that corresponds to the most correct answer.

_____ 1. A device worn over the mouth and nose to protect the respiratory tract is a

a. respirator
b. face shield
c. miter filter
d. facial protector

_____ 2. A tool used to hold and dispense adhesives from tubes is a

a. glue pump
b. adhesive miter
c. protractor
d. caulking gun

_____ 3. Equipment that is used by workers to elevate them to the proper working height is called

a. stilts
b. drywall foot lift
c. hopper
d. protractor

_____ 4. A device used to guide a saw at the proper angle for cutting material is a

a. vise
b. c-clamp
c. miter box
d. hone

May be photocopied for student use.

votech

_____ 5. The process of sharpening a cutting tool on a stone is to

a. soapstone
b. hone
c. fret
d. file

_____ 6. Equipment used to apply tape and mud to drywall joints is a

a. banjo
b. taping machine
c. hopper dispenser
d. both a and b are correct

_____ 7. An instrument used to lay out angles is a

a. fret
b. level
c. protractor
d. rule

_____ 8. Special electrical circuits designed to prevent electrical shock to personnel are

a. OSHA circuits
b. EPA devices
c. GFCI circuits
d. AC shields

_____ 9. A term often used to describe the joint compound used to finish drywall is

a. adhesive
b. mud
c. soap
d. dough

_____ 10. A receptacle for delivering or discharging material to the point of application is a

a. hopper
b. banjo
c. projector
d. pump

May be photocopied for student use

______11. A tool used to smooth rough-cut edges of drywall is a

a. wire brush
b. shear
c. drywall fret
d. rasp

______12. A tool used to cut out openings in drywall for electrical boxes is a

a. drywall saw
b. shears
c. outlet cutter
d. hole saw

OBJECTIVE 2 **From alternatives, choose the proper care and safety guidelines for the use of hand and power tools.**

______ 1. When using power tools, you must

a. wear eye protection
b. wear a hard hat
c. wear a respirator, when necessary
d. all the above

______ 2. Use of some power tools require

a. operator certification
b. use of ungrounded AC power cords
c. removal of safety shields
d. all the above

______ 3. Which of the following ladder safety guidelines in NOT true?

a. Fully spread and lock stepladders before using.
b. Carry a load up a ladder.
c. Never ascend to the top step of a ladder.
d. Do not exceed the weight limits of the ladder.

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______ 4. Always inspect a ladder to ensure

a. it has safety shoes
b. you will not exceed its weight limit
c. non-metallic ladders are used near electricity
d. all the above

______ 5. If a co-worker is working on a ladder, he/she should

a. not allow others to ascend the ladder
b. ascend to the very top step
c. carry heavy loads up the ladder
d. all the above

______ 6. As you assemble and use scaffolds, you must

a. observe OSHA regulations
b. install all braces and accessories
c. read and follow all manufacturer's instructions
d. all the above

NOTE: Objectives 3-9 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use

WRITTEN TEST ANSWERS

INTERIOR SYSTEMS TOOLS

A 2

OBJECTIVE 1

1. a
2. d
3. a
4. c
5. b
6. d
7. c
8. c
9. b
10. a
11. d
12. c

OBJECTIVE 2

1. d
2. a
3. b
4. d
5. a
6. d

OBJECTIVES 3-10

Objectives 3-10 are evaluated using assignment and job sheets.

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) *Introduction to Interior Systems*

UNIT NUMBER AND TITLE — A 2 Interior Systems Tools

TOTAL NUMBER OF TEST QUESTIONS 18

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-12	X
2	1-6	X
3-10	Evaluated on AS and JS	

OBJECTIVE SHEET

APPLIED SKILLS

A 3

INTRODUCTION

There are many skills required of a carpenter. This unit describes those skills and provides practice exercises to install insulation, drywall, window trim, a factory-built cabinet, underlayment, and a suspended ceiling system.

PREREQUISITE

Fundamentals of Construction

UNIT OBJECTIVE

After completing this unit, the student will be able to state popular methods and install selected interior systems. The student will demonstrate these competencies by completing the job sheets and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to show the ability to:

1. Given a list of terms associated with applied skills for interior systems, match them to their definitions.
2. Select the word that correctly completes statements concerning the installation methods used to install insulation.
3. Given incomplete statements, select the word or phrase that correctly completes guidelines for drywall installation.
4. Choose the guidelines for planning the installation of interior doors.
5. Name popular methods to install acoustical ceilings.
6. Install blanket insulation with an integral vapor barrier in walls. (Job Sheet 1)
7. Install drywall. (Job Sheet 2)
8. Install a factory-built cabinet. (Job Sheet 3)

9. Install underlayment. (Job Sheet 4)
10. Erect a suspended ceiling system. (Job Sheet 5)

SUGGESTED ACTIVITIES

APPLIED SKILLS

A 3

PREPARATION

- Review unit and plan presentation.
- Order or obtain materials to supplement unit.
- Introduce unit.

DELIVERY

Objective 1: Given a list of terms associated with applied skills for interior systems, match them to their definitions.

- Use the Information Sheet to discuss terms associated with applied skills.
- Describe alternative definitions that may be used in your geographical area.

Objective 2: Select the word that correctly completes statements concerning the installation methods used to install insulation.

- Describe the benefits of using insulation and the preferred R-rating of insulation for your specific geographic area.
- Use Transparencies 1-3 to supplement your discussion.
- Discuss the need to carefully review manufacturer's instructions for safety and application requirements.

Objective 3: Given complete statements, select the word or phrase that correctly complete guidelines for drywall installation.

- Discuss the safety issues involved in drywall installation. Emphasize the use of T-braces, foot lifts, and drywall lifts as important tools in preventing back strain and injuries.
- Ask a drywall installer to address your class.

Objective 4: Choose the guidelines for planning the installation of interior doors.

- Set up a mock-up of an interior door without wall coverings. Show the students the exposed framing members and discuss.

Objective 5: Name popular methods to install acoustical ceilings.

- Use the Information Sheet to explain the popular methods to install acoustical ceilings.

- Use Transparency 4 to discuss.

APPLICATION

Objective 6: Install blanket insulation with an integral vapor barrier in walls. (Job Sheet 1)
Objective 7: Install drywall. (Job Sheet 2)
Objective 8: Install a factory-built cabinet. (Job Sheet 3)
Objective 9: Install underlayment. (Job Sheet 4)
Objective 10: Erect a suspended ceiling system. (Job Sheet 5)

- Show the AGC video series titled *Interior Systems.*

- Allow students to practice the procedures in the job sheets.

EVALUATION

Pretest

- Give written test as pretest.

- Determine individual study requirements from pretest results.

- Counsel students individually on pretest results and study requirements.

- Modify materials in unit or create supplementary materials for individual students as required.

Skill Test

- Evaluate students on job sheet activities.
- Complete appropriate section of competency profiles.
- Reteach and reevaluate if necessary.
- Modify materials in unit or create supplementary materials for individual students as required.

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Complete appropriate sections of competency profiles.
- Reteach and retest if necessary.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Install Drywall* (VHS, 25 min.)
- *Install Pre-Built Cabinets and Countertops* (VHS, 15 min.)
- *Install Suspended Ceilings* (VHS, 15 min.)

These videos are available through the Oklahoma Department of Vocational and Technical Education or AGC of America, 1957 E. Street N.W., Washington, D.C., 20006.

UNIT REFERENCES

- Toenjes, Leonard P. *Building Trades Dictionary*. American Technical Publisher, Inc.: Homewood, IL. 1989.
- Willey, Al. *Residential Carpentry*. Stillwater, OK: Oklahoma Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America. 1993.

INFORMATION SHEET

APPLIED SKILLS *A 3*

OBJECTIVE 1

Given a list of terms associated with applied skills for interior systems, match them to their definitions.

- **bedding** — process used to embed perforated tape to drywall joints
- **blocking** — a term used to describe backing material, such as 2× lumber, that is placed in walls to provide a firm anchoring for cabinets or sinks to walls.
- **Btu** — abbreviation for British thermal unit and is the amount of heat needed to raise the temperature of one pound of water one degree Fahrenheit
- **clearance** — spacing, as an example, between the edge of a door and jamb or between the jamb and the trimmer stud
- **compressive strength** — the ability of a substance or material to resist a load force that tends to squeeze or shorten it
- **contraction** — the natural tendency of a system or material to shrink because of cold weather
- **cutouts** — openings that are made in drywall for convenience of access to other areas or for electrical outlets, etc.
- **dimple** — impression on a drywall surface formed by a nail being driven to its proper depth
- **door schedule** — a listing that identifies the type, size, and location of doors for a given building
- **double nailing** — pattern used when two nails are spaced 2 inches apart every 12 inches
- **expansion** — the natural tendency of a system or material to enlarge because of heat and/or moisture

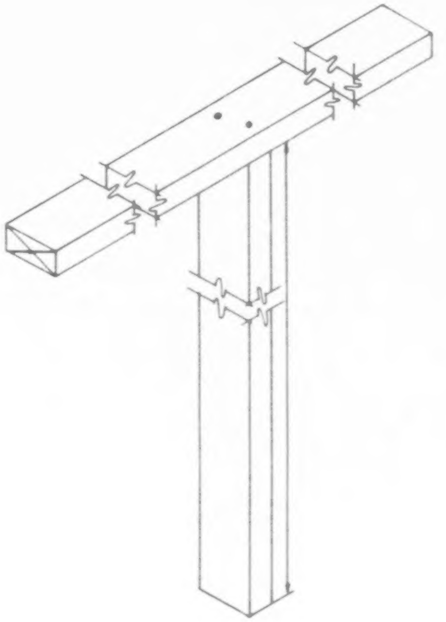
- **featheredge** — to spread joint compound or topping so that it tapers to a thin layer
- **hand or swing** — terms that identify the direction a door opens
- **joint** — place where edges of two pieces of drywall meet
- **laminate** — to bond together two or more layers of material
- **lineal feet** — one dimensional measurement

  EXAMPLE: Interior trim is measured in length only.

- **perforated tape** — paper tape used as reinforcement at drywall joints to keep surface from cracking
- **popping** — a term used to describe drywall fasteners being forced out of wall and ceiling framing; this could be a result of improper fasteners being used, spacing of fasteners not adequate, bowing of drywall, contraction or a shift in framing position.
- **rough opening** — a wall opening framed to receive a finish component such as a door or window frame
- **rough-in** — the initial installation of electrical wires, plumbing, etc., work that must be done before finish material can be installed
- **scribe** — adjustable tool used to transfer irregular parallel marks on an object for cutting and fitting a piece of material
- **shims** — thin pieces of material used to adjust and fill a space between two members; often wood shingles are cut into small pieces and used as shims
- **skids** — packaging used to protect and to provide a platform for transporting factory-built cabinets

- **T-brace** — a brace used to hold drywall in place, against the ceiling joist, while fasteners are being installed and/or adhesive is setting (Figure 1); it is also used to temporarily hold wall cabinets in place while securing.

FIGURE 1



OBJECTIVE 2

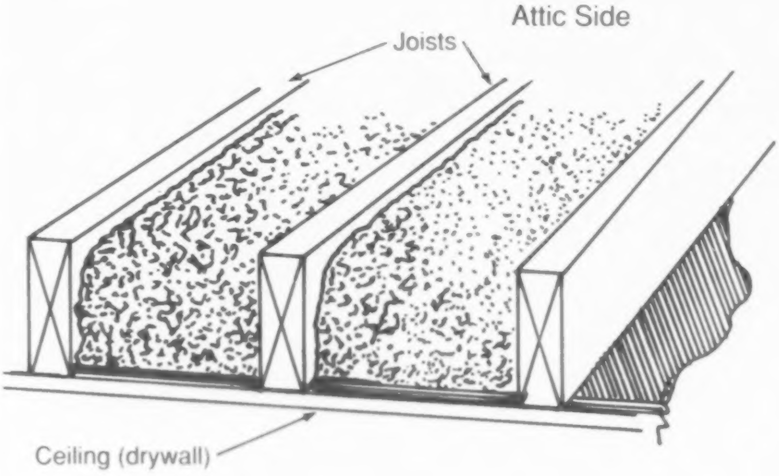
Select the word that correctly completes statements concerning the installation methods used to install insulation.

- Common methods used to install insulation
  - Blown-in (ceilings)
  - Batt insulation held with adhesive or staples (walls)
  - Friction fit

- Vapor barrier strips held with staples, tape, or adhesive (doors/windows)
- Rigid insulation and vapor barriers (concrete slab on-grade)

- Ceiling insulation
  - Blown-in insulation is the most common type used in ceilings of residential buildings.

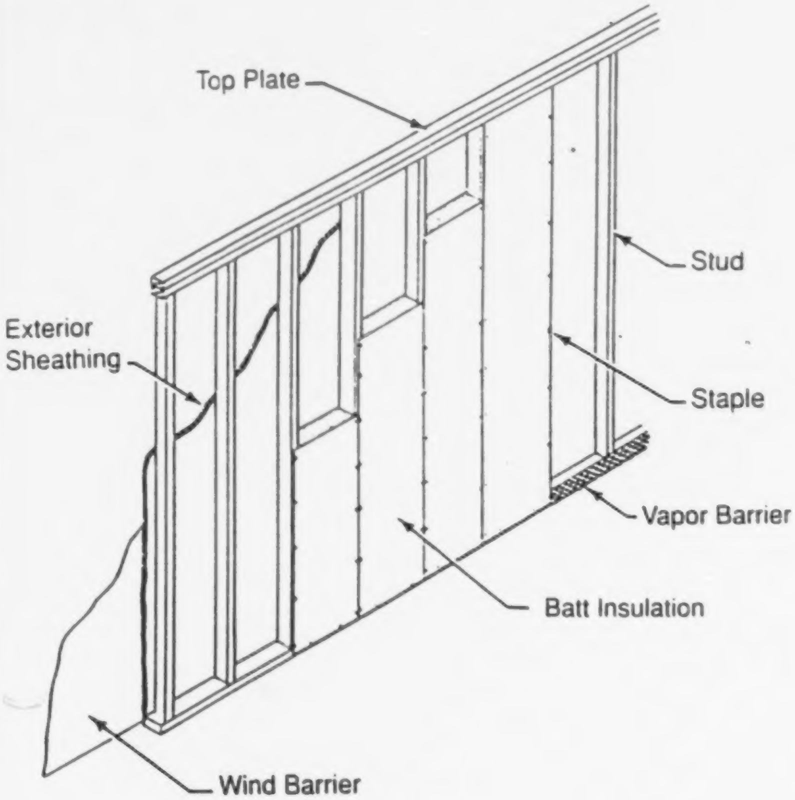
FIGURE 2



- Commercial buildings use a variety of ceiling insulation types depending on the design of the structure.

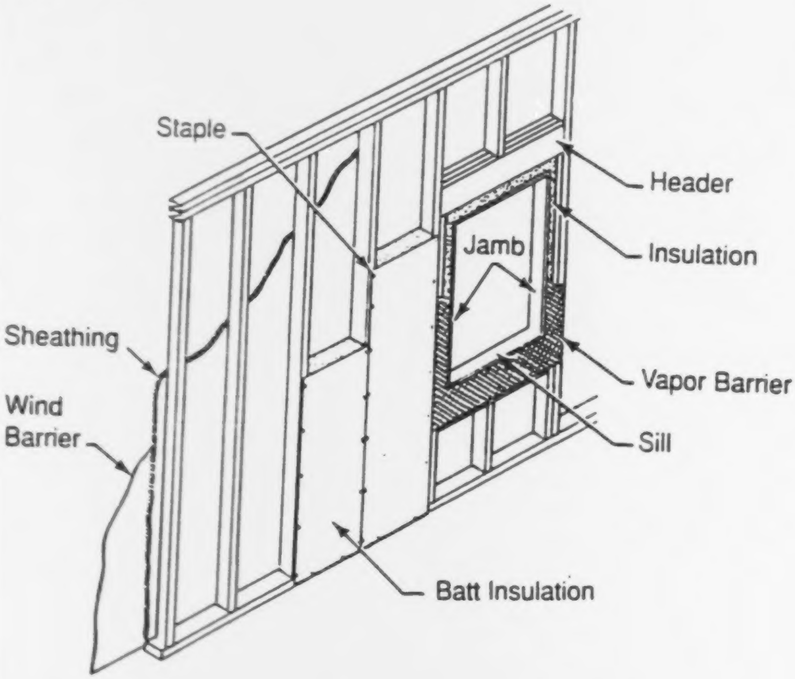
- Wall insulation
    - Batt insulation with an integral vapor barrier is popular in both residential and commercial buildings

FIGURE 3


Top Plate
Stud
Exterior Sheathing
Staple
Vapor Barrier
Batt Insulation
Wind Barrier

- Openings such as doors and windows require insulation to be cut and placed into cracks. A strip of vapor barrier can be held in place with adhesive or staples.

FIGURE 4


Staple
Header
Jamb
Insulation
Sheathing
Vapor Barrier
Wind Barrier
Sill
Batt Insulation

OBJECTIVE 3 **Given incomplete statements, select the word or phrase that correctly complete guidelines for drywall installation.**

- Methods used to apply drywall
  - Nailing method
  - Adhesive method
  - Nail-on and adhesive method
  - Double nailing method
  - Screw method

- Inspecting the facility

  Ensure that these steps have been completed *before* installing drywall.

  - Ceiling backing has been installed
  - Walls and studs straight
  - Blocking for cabinets, sinks, and bath fixtures has been installed
  - Electrical rough-in completed
  - Plumbing rough-in completed
  - Heating vent and air conditioning rough-in completed
  - Exterior wall insulation has been installed
  - All code inspections have been made and approved
  - Ensure electrical wiring is safety routed and protected. Driving nails or use of a metal utility knife could come into contact with electrical wiring and cause electrical shock and/or damage to wirings.

- General guidelines for installing drywall
  - Always apply drywall at right angles to ceiling joists.
  - When specified, install drywall horizontally on walls (it may also be installed vertically).
  - Cut openings for fixtures no more than ⅛ inch larger than fixture.
  - When sanding joint compound, do not damage the face of the drywall.
  - Stagger sheets on opposite side of wall so that joints occur on different studs.

— Wear protective respirator/dust mask and goggles when sanding drywall joints.

— Closely follow recommendations for drywall fastener quantities, size, and spacing to prevent fastener "popping."

- Specific guidelines for installing drywall

1. Planning

   There are several considerations in planning a drywall job. These steps will improve the appearance and reduce the cost.

   a. Consider the use of 12′ or 8′ lengths of drywall.

   b. Plan to install the drywall across the studs and/or joists.

   c. Refer to the specifications for instructions to hang drywall.

   d. Decide if the job plans require the use of nails, screws, and/or adhesive as the method of application.

   e. Build "T" braces and ensure all tools and material are readily available and ready for use.

2. Tools required

   The basic tools you need are

   a. Utility knife and heavy-duty knife blade

   b. Drywall screwgun, hammer, or regular crown-head carpenter's claw hammer

   c. 4-foot T-square or steel straightedge

   d. Steel tape measure

e. Utility saw or keyhole saw

f. Joint-finishing knives with 4-inch and 10-inch blades

g. Plastic pan for joint compound

h. Sandpaper (medium texture) for joint finishing

i. Caulking gun

j. T-braces (optional)

k. Protective respirator

l. Pencil

3. Cutting drywall

   a. Use T-square for marking and a utility knife for scoring. With the knife at right angles to the board, score completely through the face paper. Then apply firm, even pressure to snap the board. Fold back the partially separated portion of the board and use the knife again to cut the back paper.

   b. Rough edges should be smoothed. Sheets can be cut with a saw if desired.

4. Cutting openings

   a. It may be necessary to cut holes in the drywall for electrical outlets, light receptacles, etc. The distance of the opening from the end and edge of the board should be carefully measured and marked on the face of the drywall. The opening should then be outlined in pencil and cut out with a keyhole saw.

   b. The cutout should be no more than ⅛" larger than outlet. The cutout must be accurate or the cover plate will not conceal the opening.

5. Ceiling installation

    a. It is more difficult to install the ceiling boards because of the overhead positioning. It is desirable to have T-braces to hold the board in place while it is being installed. A satisfactory T-brace consists of a 2-foot piece of 1×4 nailed onto the end of a 2×4. The length should be about 1 inch longer than the floor-to-ceiling height. The brace is placed at a slight angle and pushed into place.

    b. If nails are used, they should be 7 inches apart. When the adhesive nail-on method is used, the edges should be nailed, using only one nail per joist in the field of the board. All edges should be supported on framing. The nails should be driven to bring the board tight to the framing, then another blow struck to dimple the nail, being careful not to break the face paper.

6. Wall application

    a. In horizontal application on sidewalls, install the top board first. Push the board up firmly against the ceiling and nail, placing nails 7 inches apart. One exception, however, is to keep all nails back 7 inches from interior ceiling angles. Nails in the interior angles are quite likely to pop. If the adhesive nail-on method is used, most of the field nailing can be eliminated. The nailing is around the edges of the board only. If the board is bowed out in the center, it may be advisable to secure it with a few temporary nails until the adhesive sets.

    b. A vertical application places the long edges of the wallboard parallel to the framing members. This is more desirable if the ceiling height of your wall is greater than 8′-2″ or the wall is 4 feet wide or less. Nailing recommendations are the same as for a horizontal application.

7. Metal corner bead

   a. To protect corners from edge damage, install metal corner bead after you have installed the drywall. Nail the metal corner bead every 5 inches through drywall into wood framing.

8. Joint finishing

   a. A premixed material such as joint compound is the easiest to use to finish joints, corners, and nailheads. A minimum of three coats of joint compound is recommended for all tapered joints. This includes an embedding coat to bond the tape and two finishing coats over the tape. Each coat should dry thoroughly, usually 24 hours, so that the surface can be easily sanded.

   b. When sanding, wrap your sandpaper around a wood sanding block so you sand the surface evenly. Do not over-sand or sand the paper surface. This may outline the joint or nailhead through the paint.

   c. Wear a protective respirator and goggles while sanding.

9. Applying bedding compound

   a. Use your 4-inch joint-finishing knife to apply the joint compound fully and evenly into the slight recess created by the adjoining edges of the board.

10. Applying drywall tape

    a. Next, take your drywall tape and center it over the joint. Press the tape firmly into the bedding compound with your drywall knife held at a 45-degree angle. The pressure should squeeze some compound from under the tape, but enough must be left for a good bond.

11. Applying finishing coats

    a. When thoroughly dry, at least 24 hours, lightly sand. Then apply a fill coat extending a few inches beyond the edge of the tape, and feather the edges of the compound. When the first finishing coat is thoroughly dry, use your 10-inch joint-finishing knife to apply a second coat, and feather the edges about 1½ inches beyond the first coat.

    b. When this coat is dry, sand lightly to a smooth, even surface. Wipe off the dust in preparation for the next step.

       NOTE: Do not sand the drywall to the tape. If you do, use a wet sponge to mop the surface.

    c. Be sure to use protective respirator and goggles when sanding.

12. Finishing nailheads

    a. Draw your 4-inch joint-finishing knife across nails to be sure they are below the surface of the board. Apply first coat of joint compound with even pressure to smooth compound level with the surface of the board. Do not bow knife blade with excess pressure as this tends to scoop compound from dimpled area.

    b. When dry, lightly sand before you apply second coat; let dry; sand lightly, and apply third coat. Sand lightly before applying your decoration.

    c. Be sure to use a protective respirator/dust mask and goggles when sanding.

13. Finishing end joints

    a. You use basically the same steps with end or butt joints as you do for tapered edges. The end joints are not tapered, so care must be taken not to build up the compound in the center of the joint. This encourages ridging and shadowed areas. Feather the compound well out on each side of the joint. Final application of joint compound should be 14 to 18 inches wide.

14. Finishing metal corner bead

    a. Be sure the metal corner is attached firmly. Take your 4-inch finishing knife and spread the joint compound 3 to 4 inches wide from the nose of the bead covering the metal edges. When completely dry, sand lightly and apply second coat, feathering edges 2 to 3 inches beyond the first coat. A third coat may be needed, depending on your coverage. Feather the edges of each coat 2 or 3 inches beyond the preceding coat.

    b. Be sure to use a protective respirator/dust mask and goggles when sanding.

OBJECTIVE 4 **Choose the guidelines for planning the installation of interior doors.**

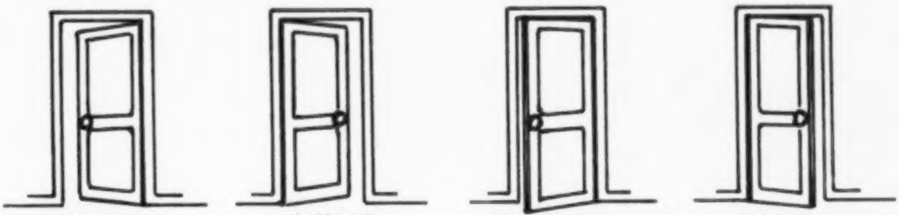
- General guidelines for planning a door installation
  - Read the door schedule.
  - Determine the swing of the door.
  - Plan the finish clearances.
  - Compute the rough opening size.
  - Plan the position of door accessories.
- Read the door schedule
  - Door sizes are specified in the door schedule using a standard numbering system. As an example, a 3068 door measures 3′0″ in width and 6′8″ in height.

— Door types and locations are also provided in the door schedule.

- Determine the hand or swing of the door

  Hand or *swing* of a door refers to which direction a door opens as viewed by someone standing outside the room and facing the door. The swing is specified in the building plans using standard abbreviations (Figure 5).

FIGURE 5



Right Hand (RH)

Left Hand (LH)

Right Hand Reversed (RHR)

Left Hand Reversed (LHR)

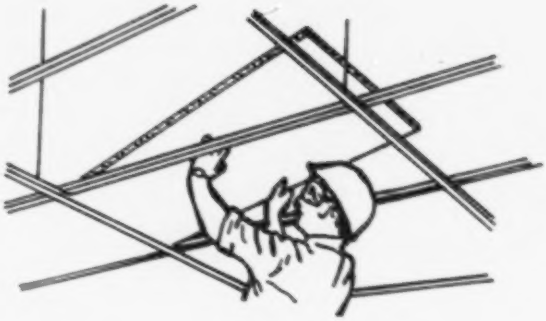
1. Right hand
   a. Hinges are on the right
   b. Door swings away from you

2. Left hand
    a. Hinges are on the left
    b. Door swings away from you
3. Right hand reverse
    a. Hinges are on the right
    b. Door swings toward you
4. Left hand reverse
    a. Hinges are to your left
    b. Door swings toward you

OBJECTIVE 5 **Name popular methods to install acoustical ceilings.**

- Cementing to a firm surface
    — Adhesive is placed on the back of each tile and then pressed into position
- Fasteners
    — Tiles are secured by using nails, staples, or screws.
- Suspended systems
    — metal moldings and cross members form a grid which is suspended from the structure with wires. Once the framework is installed, tile panels are lifted and positioned on the flanges of the metal frame (Figure 6).

FIGURE 6



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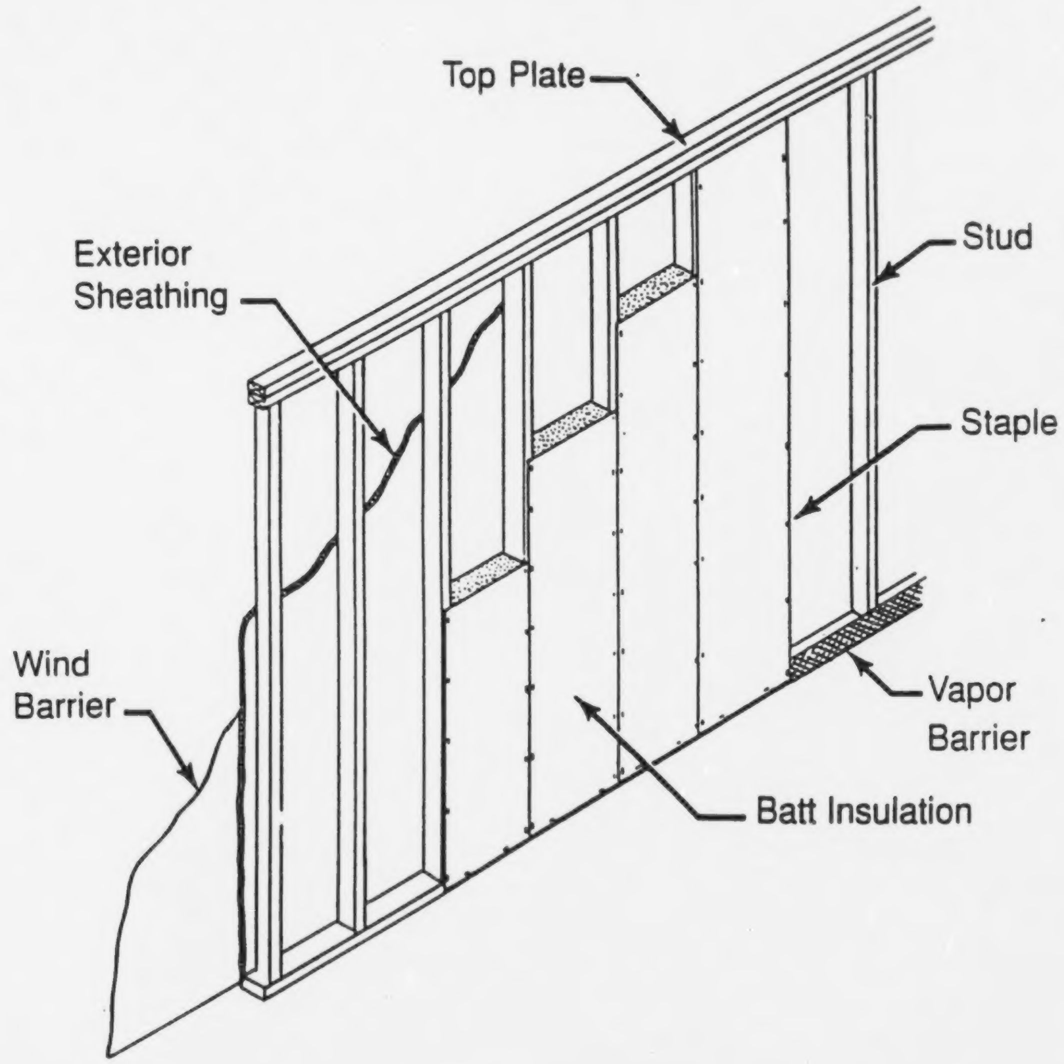
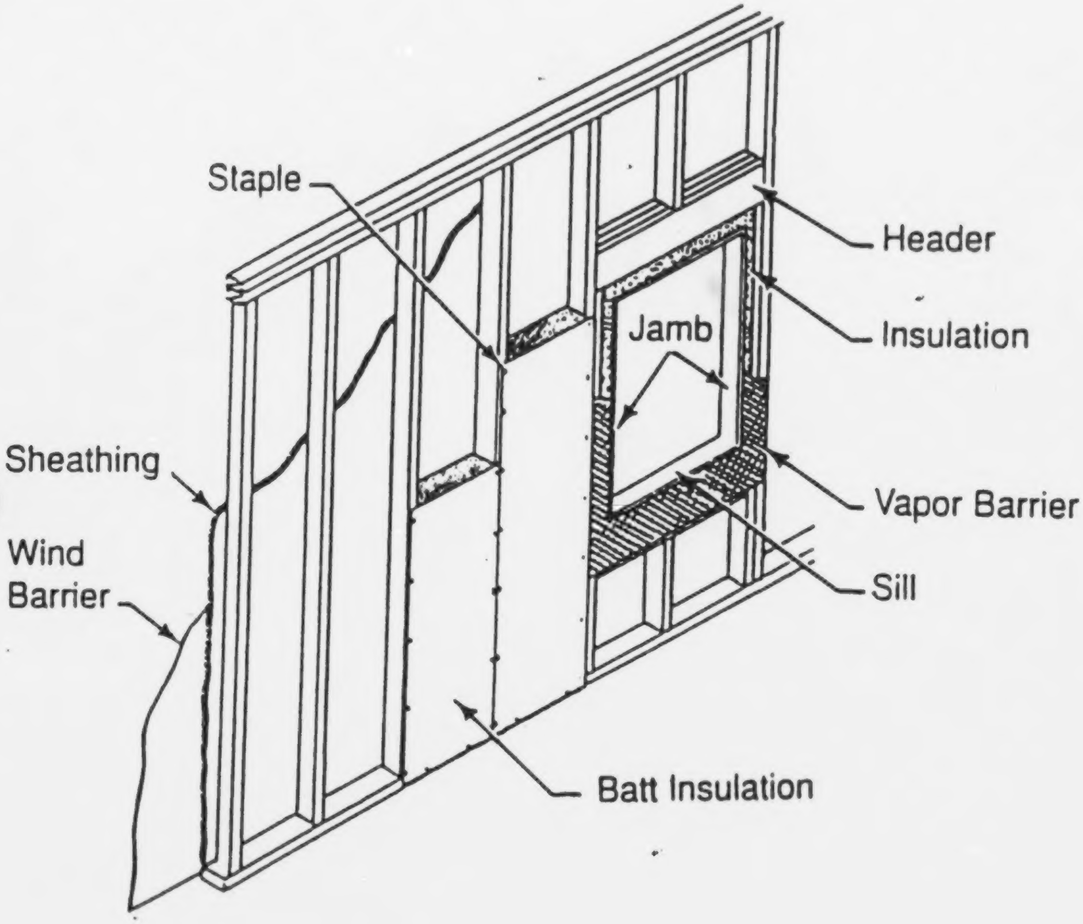
Installation Methods

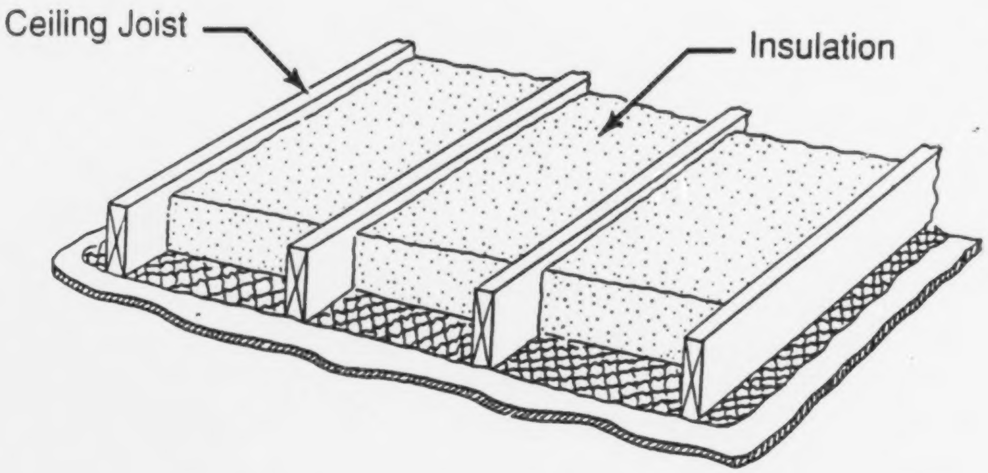

Top Plate
Exterior Sheathing
Stud
Staple
Wind Barrier
Vapor Barrier
Batt Insulation

Wall section with batt insulation
(with integral vapor barrier)

Installation Methods
(Continued)

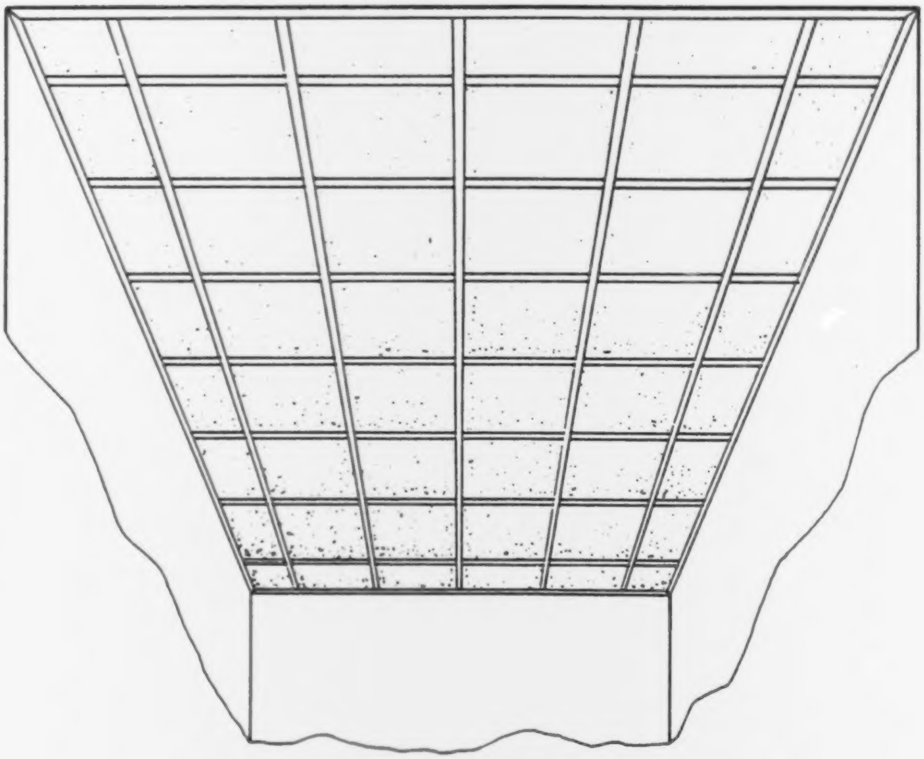

Staple
Header
Jamb
Insulation
Sheathing
Vapor Barrier
Wind Barrier
Sill
Batt Insulation

Installation Methods
(Continued)


Ceiling Joist
Insulation

Ceiling with fill insulation

Suspended Ceiling System



JOB SHEET 1

APPLIED SKILLS

A 3

OBJECTIVE 6

Install blanket insulation with integral vapor barrier in walls.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Utility knife or shears
- Hand or pneumatic stapler
- Staples
- Tape measure
- Insulation batts
- Pencil
- Respiratory equipment as recommended by manufacturer and/or MSDS
- Vapor barrier material

PROCEDURE

Yes No

1. Put on OSHA-required personal protection equipment. _____ _____

2. Measure vertical distance to be filled with insulation, and add 3 inches to that measurement. _____ _____

   NOTE: Insulation should be 3 inches longer than the space to be filled; this allows enough length so that some of the batting can be removed from both ends to allow nail flanges on top and bottom. (Figure 7)

Research and Reference Skills
- Use standard references

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

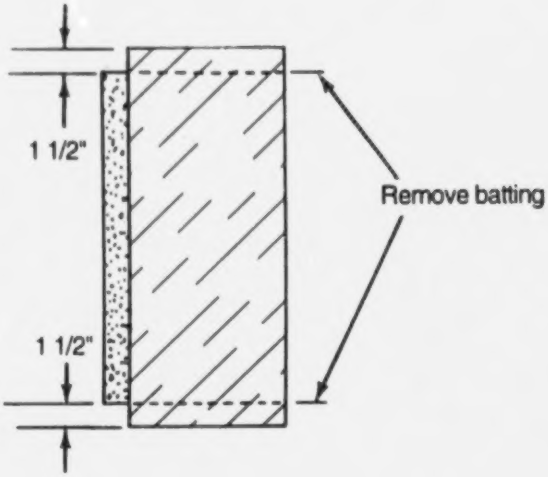
Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No

FIGURE 7

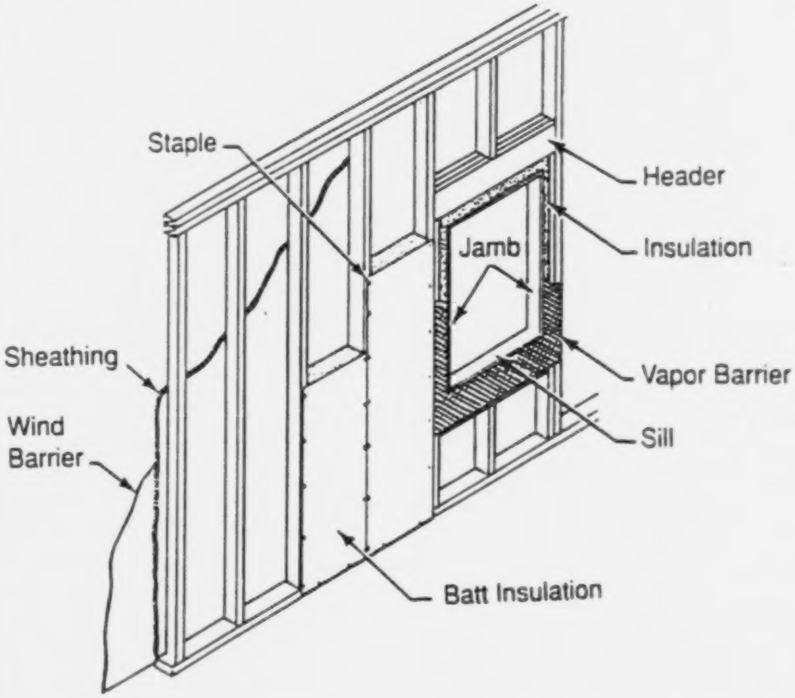


	Yes	No
3. Mark on the floor the length determined in step 2.	____	____
4. Roll out insulation between marks on floor and cut insulation to length.	____	____

NOTE: Save cut-off ends and pieces so that they may be used to fill small spaces around windows, doors, electrical boxes, and any other small opening (Figure 8).

	Yes	No

FIGURE 8


Staple
Header
Insulation
Jamb
Sheathing
Vapor Barrier
Wind Barrier
Sill
Batt Insulation

	Yes	No
6. Make nail flanges by removing 1½ inches of batting from the insulation's covering on each end of the cut length.	_____	_____

NOTE: Sides are normally pre-cut with 1½" nailing flanges/tabs.

	Yes	No
7. Place insulation in wall opening with nail flange over top plate and side tabs over studs; carefully fit and cut insulation around pipes, conduits, electrical boxes and window and door frames (Figure 8).	_____	_____

	Yes	No
8. Place insulation behind electrical boxes.	____	____
9. Staple the top nail flange to top plate and then, working from top to bottom, placing staples no more than 12 inches apart.	____	____
10. Staple bottom nail flange to soleplate.	____	____
11. Follow procedures until all walls are insulated.	____	____
12. Check to see that no openings were missed an that all the insulation is properly installed; fill these openings as necessary. **NOTE:** In areas where no vapor barrier exists, such as headers, below window openings, etc., add these barriers.	____	____
13. Clean up area and put away equipment and supplies.	____	____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS ______________________________________

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Insulation tightly fitted (¼″)	4	3	2	1
Vapor barrier is continuous	4	3	2	1
Insulation behind electrical boxes	4	3	2	1
Properly stapled (12″±1)	4	3	2	1

EVALUATOR'S COMMENTS

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training
3 **Moderately Skilled** – Has performed job during training program; limited additional training may be required
2 **Limited Skill** – Has performed job during training program; additional training is required to develop skill
1 **Unskilled** – Is familiar with process, but is unable to perform job

OBJECTIVE 7

Install drywall.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Steel tape measure
- Nail pouch
- Utility knife
- T-square
- Drywall (½" thickness)
- Drywall lift
- Circle cutter
- Drywall or keyhole saw
- Drywall rasp
- Metal corners
- Screws and screwgun
- Pencil
- Chalk box/line

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

For ceiling installation. Yes No

NOTE: In this example, ceiling drywall will be applied first. Before any drywall is applied, be sure that electrical, water, gas, heating, and air-conditioning rough-in have been completed, that the building code (rough in) inspection has been completed and approved, and that the exterior wall insulation has been installed.

1. Put on safety goggles and hard hat. ____ ____

2. Lay out drywall

   a. Measure 48¼ inches out at each end of the room and mark ceiling joists. Strike a chalk line *across* all joists at these marks. The extra ¼ inch will allow for variations in the framing. ____ ____

Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
3. Measure the first full sheet of ceiling drywall.		
a. Begin at one end of the room—measure the distance from the end wall to the center of that joist nearest, but less than the length of the drywall (example: 8 feet). Subtract ¼ inch from this measurement (example: 7'-11¾").	_____	_____
b. Mark the drywall to the length determined in step "a" above (example: 7'-11¾").	_____	_____
4. Cut drywall		
NOTE: Drywall joints must fall on the center of joists.		
a. Mark measurements on finished face of drywall.	_____	_____
b. Hold straightedge or T square on marks and use sharp knife to cut through face paper.	_____	_____
c. Break drywall at cut.	_____	_____
d. Use utility knife to cut paper on back side of the drywall sheet.	_____	_____
e. Use drywall rasp to smooth edge if necessary.	_____	_____

Yes No

5. Cut openings for fixtures, electrical boxes, switches, etc.
    a. To cut the openings, measure the distance of the opening from the end and from the edge of the drywall. ____ ____
    b. Mark the measurement on the face of the drywall. ____ ____

        NOTE: Opening should be no more than ⅛ inch larger than fixture. The fixtures must be secured to the metal ceiling joists or hangers.

    c. Cut the opening with a drywall saw. ____ ____
6. Using a screwgun, install drywall screws or nails.
    a. Use a T-brace to hold the drywall against the ceiling joists. ____ ____
    b. Space the screws 12″ apart. ____ ____
    c. Install the screws so that they create a slight dimple without breaking the surface of the drywall. ____ ____

        NOTE: If fire codes require double-layer drywall to be installed, consult your building plans for the correct drywall screw length and space requirements.

Yes No

PROCEDURE

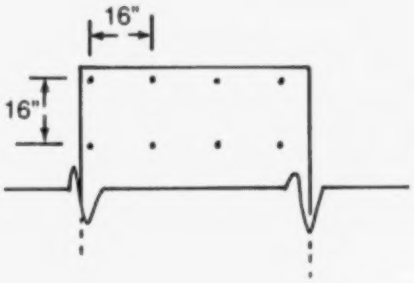
Wall Installation

1. Install first full sheet of drywall vertically. ____ ____

   a. Beginning in a corner, hold full sheet of drywall tightly against corner and ceiling drywall. Use the drywall lift to hold the sheet in position.

   b. Place drywall screws 16" apart. ____ ____

FIGURE 9

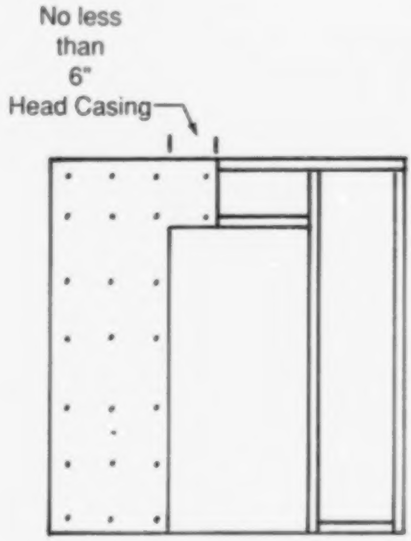


2. Cut and install remaining drywall.

   a. Drywall joints should be at no less than six inches from the end of window or door headers. (Figure 10) ____ ____

Yes No

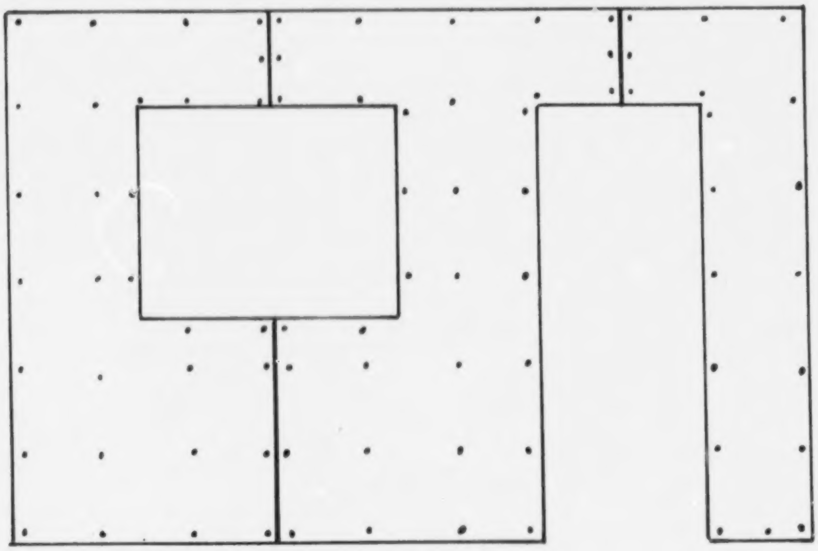
FIGURE 10


No less
than
6"
Head Casing

b. Continue cutting and installing as required to complete drywall installation (Figure 11). ____ ____

Yes No

FIGURE 11



NOTE: Drywall over door and window openings may be put in position and cut in place.

PROCEDURE

Yes No

For installing metal corner beads.

NOTE: Metal corner beads are used only on outside corners.

1. Measure length of outside corner. _____ _____
2. Cut metal corner bead to length as needed. _____ _____
3. Position metal corner bead over outside corner and screw corner bead every 5 inches on both edges through drywall into framing. _____ _____
4. Clean up area and put away equipment and supplies. _____ _____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

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____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Fastener at proper distance (½″)	4	3	2	1
Joints tight (¹⁄₁₆″)	4	3	2	1
Straight cuts (⅛″)	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY	
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	1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 3

APPLIED SKILLS

A 3

OBJECTIVE 8

Install a factory-built cabinet.

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Framing square
- Level
- Claw hammer
- Steel tape
- Scribe
- Block plane
- Nail sets
- Handsaw
- Circular saw and extension cord
- Cabinet units
- 2 × 4 scrap material
- 2-inch and 2½-inch #8 or #10 wood screws
- Sawhorses, 1 pair

PROCEDURE

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

Math Application Skills
- Use English and metric measures

	Yes	No
NOTE: Setting of base cabinet and top cabinet sequence is optional.		
1. Put on safety goggles and hard hat.	_____	_____
2. Locate and mark stud locations.	_____	_____
3. Install wall unit.		
a. Remove the skids and other packaging.	_____	_____
b. Check wall cabinet to be sure it is the same length as the base cabinet.	_____	_____
c. Find and mark the studs.	_____	_____
d. Cut two 2×4 T-braces slightly longer than the desired distance between the wall cabinet and the floor.	_____	_____

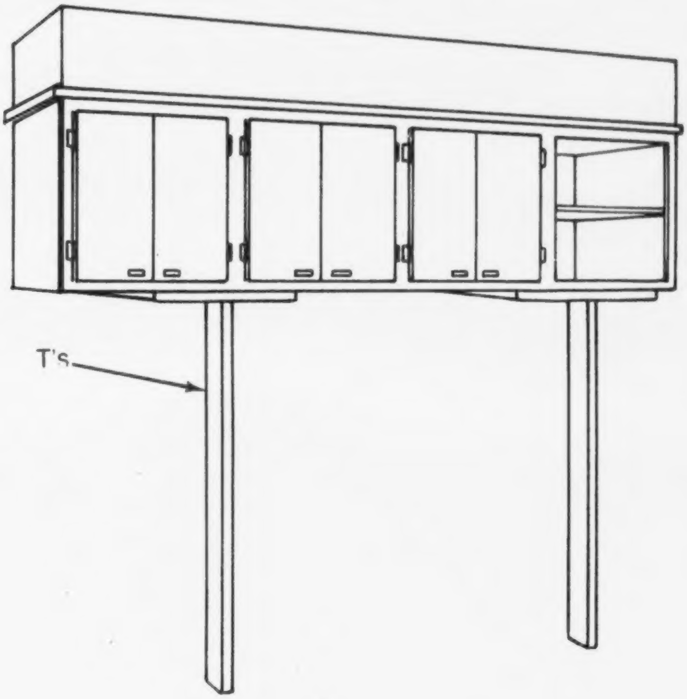
Functional Math Skills
- Make measurements

General Science Skills
- Use scientific instruments

Job Acquisition/ Development Skills
- Master specific job task/procedure
- Practice good work habits/attitudes

	Yes	No
e. Set the wall cabinet on top of the T's and wedge the cabinet up tight to the soffit.	____	____

FIGURE 12

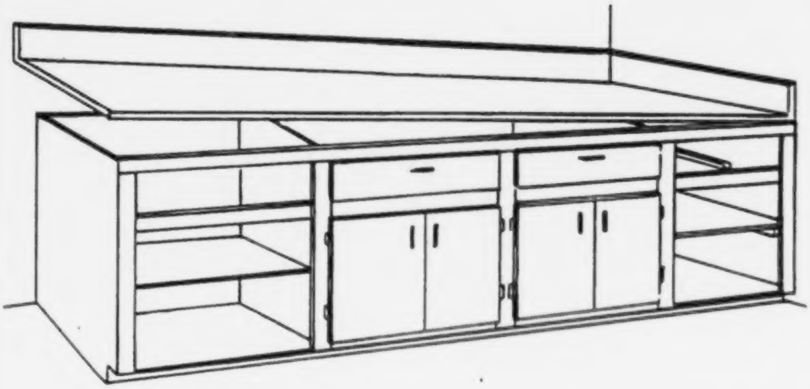


f. Check the cabinet for plumb and level.	____	____

NOTE: If the top cabinet is not plumb and level, it will be necessary to shim it.

		Yes	No
g.	Drill holes through the mounting strips (top and bottom) and into the studs. counter-sink the holes in the face of the mounting strips.	____	____
h.	Use wood screws to secure wall cabinet to the wall.	____	____
i.	Remove T's from under the wall cabinet.	____	____
j.	Recheck wall unit to be sure it is plumb and level.	____	____
4.	Install base cabinet.		
a.	Set base cabinet near its approximate location.	____	____
b.	Remove skids, braces, and other packaging.	____	____
c.	Check to see that there is no wall baseboard or other trim that may interfere with setting the cabinet.	____	____
d.	Move cabinet against wall in its proper location.	____	____
e.	Use shingles to shim base until top of cabinet is level across the width and depth.	____	____

FIGURE 13



		Yes	No
f.	Adjust scribe to distance between height of the cabinet and the required height.	_____	_____
g.	Scribe both ends at the bottom and across the front on the kickboard.	_____	_____
h.	Pull cabinet from wall and cut both ends and front to the established lines.	_____	_____
i.	Check the back of the cabinet and cut if it extends below end cuts.	_____	_____
j.	Drill holes through mounting strips into wall studs.	_____	_____
k.	Use wood screws to secure cabinet unit to the wall.	_____	_____
l.	Recheck unit to be sure it is level and plumb.	_____	_____

Yes No

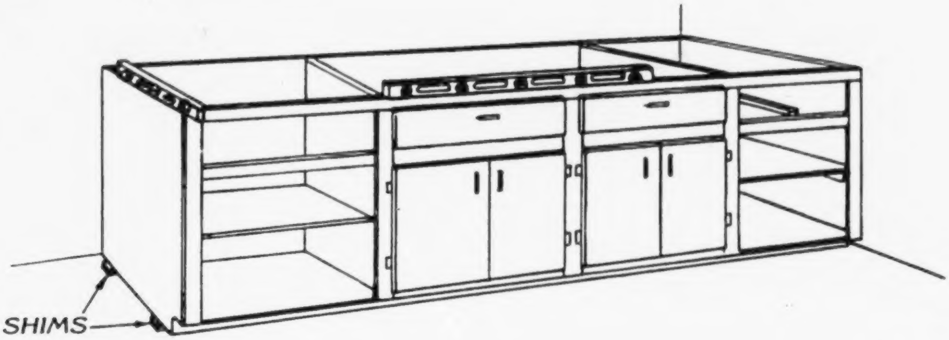
5. Install counter top.

   a. Check length of counter top to be sure it corresponds with the length of the base cabinet. _____ _____

   b. Set counter top on top of the base cabinet. _____ _____

   NOTE: Be sure counter top is tight against walls.

FIGURE 14



   c. If backsplash does not fit tight against wall, trim to fit.

      1) Scribe the top of the backsplash. _____ _____

      2) Remove counter top from base cabinet and set on a pair of sawhorses. _____ _____

Yes No

3) Trim backsplash to the scribed line. _____ _____

4) Replace counter top to the top of the base cabinet, and check along the wall for proper fit. _____ _____

d. Drill holes up through the frame of the base cabinet into the counter top. _____ _____

⚠ **CAUTION:** Be careful not to drill through the counter top.

---

e. Secure counter top to base cabinet with proper size wood screws. _____ _____

NOTE: Cabinets are set and ready for trim.

6. Clean area and put away tools and equipment. _____ _____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Cabinets plumb (⅛″)	4	3	2	1
Cabinets level (⅛″)	4	3	2	1
Cabinets properly secured to wall	4	3	2	1
Fasteners in proper place (⅛″)	4	3	2	1
Fitted countertop to wall (⅛″)	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

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1 **Unskilled** – Is familiar with process, but is unable to perform job

JOB SHEET 4 — APPLIED SKILLS — A 3

OBJECTIVE 9 — **Install underlayment.**

EQUIPMENT AND SUPPLIES

- Safety goggles and hard hat
- Steel tape
- Framing square
- Straightedge
- Claw hammer
- Chalk line
- Utility knife
- Pointing or margin trowel
- Circular saw and extension cord
- Power fastener, fasteners, and manufacturer's instructions
- One pair of saw horses
- #15 felt
- ¼" × 4' × 8' hardboard panels for underlayment
- Ring-shank, grooved, or cement-coated nails
- Power sander and sanding belts

PROCEDURE

Research and Reference Skills
- Use standard references

Functional Reading Skills
- Follow written instructions
- Interpret graphics and symbols

NOTE: At least twenty-four hours prior to installation, distribute the panels in the room where they will be used. This will condition the panels to the room's atmosphere and minimize expansion and contraction of the panels.

	Yes	No
1. Put on safety goggles, hard hat.	____	____
2. Prepare a clean work surface.	____	____
3. Mark centers of all floor joists on walls.	____	____
4. Apply #15 felt, lapping head and side joints at least 4 inches and using only enough fasteners to hold felt in place.	____	____
5. Snap lines along centers of floor joists.	____	____

Math
Application Skills

- Use English and metric measures

Functional
Math Skills

- Make measurements

General
Science Skills

- Use scientific instruments

Job Acquisition/
Development Skills

- Master specific job task/procedure
- Practice good work habits/attitudes

Yes No

6. Install first underlayment panel.

   a. Position panel in a corner at right angle to floor joists with ⅛-inch clearance between edges of panel and wall. _____ _____

   b. Secure panel, placing approved fasteners ⅜ inch from edges and approximately 6 inches on center over entire surface of panel. This may vary based on local humidity conditions. _____ _____

7. Install remaining panels.

   NOTE: Be sure to stagger the head joints of the panels and avoid aligning the joints in the underlayment with the joints in the subfloor.

   a. Measure, cut, and fit panels to size, allowing approximately 1/16 inch between panels on all sides. _____ _____

   b. Secure panels, placing fasteners ⅜ inch in from edges and approximately 6 inches on center over surface of each panel. _____ _____

8. Sand floor smooth. _____ _____

9. Clean up area and put away tools and equipment. _____ _____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Felt lapped properly (½″)	4	3	2	1
Underlayment panel at right angle to floor joists	4	3	2	1
Fastener spacing correct (1″)	4	3	2	1
Joints filled/smooth	4	3	2	1
All joints finished smoothly	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4	**Skilled** — Can perform job with no additional training
3	**Moderately Skilled** — Has performed job during training program; limited additional training may be required
2	**Limited Skill** — Has performed job during training program; additional training is required to develop skill
1	**Unskilled** — Is familiar with process, but is unable to perform job

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JOB SHEET 5 — APPLIED SKILLS — A 3

OBJECTIVE 10

Erect a suspended ceiling system.

INTRODUCTION

Suspended ceiling systems provide a method to suspend tile ceiling panels at a given height. This job sheet will allow you to lay out, install wall angles, install runners/cross ties, and install tile panels.

EQUIPMENT AND SUPPLIES

- Hard hat and goggles
- End cut nippers
- Pop rivet gun and rivets
- Nails
- Wall angles (wall molding or L molding)
- 12 gauge hanger wires
- 12-foot main runners (main tees)
- 2-foot cross tees
- 2-foot × 2-foot ceiling panels
- 100 foot tape
- Steel tape
- Chalk line
- Claw hammer
- Laser instrument and rod
- 4 foot level
- Metal snips
- Side cut pliers

PROCEDURE

Functional Reading
- Follow written instructions

	Yes	No
1. Put on safety goggles and hard hat.	_____	_____
2. Check your plans to determine the height of the ceiling and the size of the panels. In this exercise, the room is 10′4″ × 14′8″ and the panel size is 2′ × 2′.	_____	_____
3. Use a laser instrument to establish the ceiling height around the perimeter of the walls and mark.	_____	_____

Math Application
- Select/apply mathematical formula

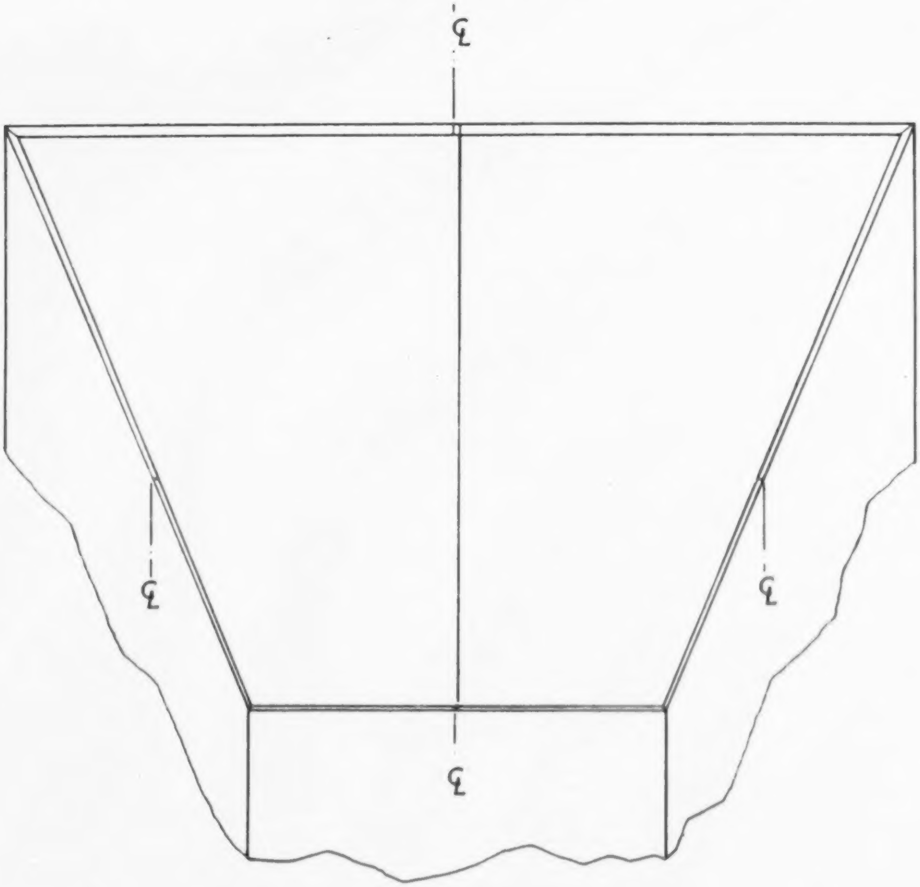
General Science
- Use scientific instruments

Job Acquisition/ Development
- Master specific job task/procedure

	Yes	No
4. Snap a chalk line approximately 1″ above these marks, to align with the top edge of the wall angle or "L's".	______	______
5. Recheck your lines.	______	______
6. Measure the length of all the walls.	______	______
7. Make sure the corners are square.	______	______
8. Determine the layout of the runners and tees from the size of the room and the size of the tile you're installing. If the ceiling size is an odd-foot measurement or if the walls aren't parallel, use the centerline of the room to establish the layout. **NOTE:** Ensure the border tiles will be 6″ or greater in width.	______	______
9. Measure and mark the centerline of the two end walls (5′2″).	______	______
10. Now, measure and mark the centerline of the two side walls (7′4″). **NOTE:** Ceiling will take 6 full tiles plus two 16″ border tiles lengthwise and 4 full tiles plus two 14″ border tiles across its width.	______	______
11. To install the wall angles, nail the top of the angle along the chalk line. The angles should overlap at the inside corners. the angles should be mitered where they meet at the outside corners. On the inside corners, you may cut a miter on the bottom angle so the corner looks like it's been mitered.	______	______
12. Transfer the centerline marks from the wall to the wall angles.	______	______

	Yes	No
13. Measure over half the width of the main runner from the centerline on both of the short walls.	____	____
14. Attach a string line to the wall at this mark, and stretch it tight to the mark on the opposite wall (Figure 15).	____	____

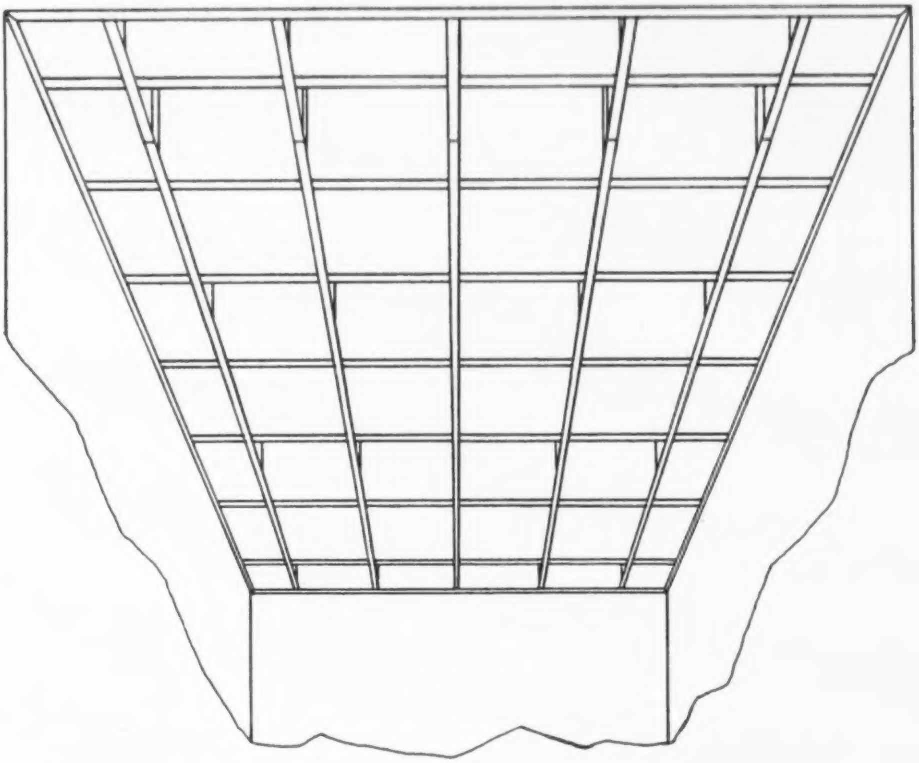
FIGURE 15



	Yes	No
15. Install the hanger wires along the main supports, within 6 inches of the ends of the main supports. Let the wires hang straight down.	_____	_____
16. Establish the proper ceiling height on the wires, allowing for the height of the main runner. Bend the wires at this point.	_____	_____
17. Next, install the main runners. Install the first main runner by positioning the runner at the proper ceiling height and securing it with the hanger wires.	_____	_____
18. Align the runner with the string line so that it is against the edge of main runner.	_____	_____
19. Be sure the main runners are fitted so that the cross tee slots are properly aligned.	_____	_____
20. Fasten one end of the main runner to the wall angle to maintain proper position.	_____	_____
21. Work from the first main runner, and install the rest of the runners, centered on two-foot-centers.	_____	_____
22. Now, install the cross tees.	_____	_____
23. Remove the string line.	_____	_____
24. Fit the ends of the cross tees into the slots on the main runners. Be sure the ends of the cross tees are inserted properly and locked in place.	_____	_____
25. Install the rest of the cross tees until the grid in completed (Figure 16).	_____	_____
26. Check the grid you completed to make sure your runners and tees are level and straight.	_____	_____

Yes No

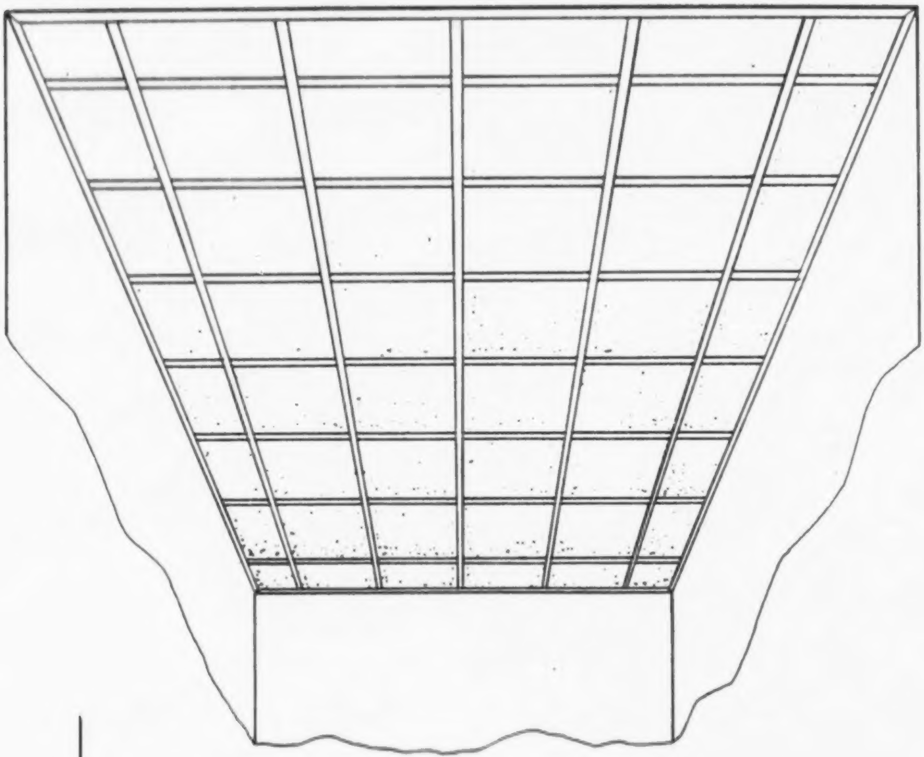
FIGURE 16



27. You're ready to install your ceiling panel. Before installing, you must make sure all building codes are met and other trades are complete. Due to variations in shading, you should mix tiles from several boxes. ____ ____

	Yes	No
28. Measure and cut the border panels. Install the first border panel.	_____	_____
29. Follow the same procedure to install the rest of the panels (Figure 17)	_____	_____

FIGURE 17



		Yes	No
30.	When the project is finished, put away all tools and materials and clean the work area.	____	____
31.	This completes the job sheet on suspended ceilings. If you have any questions, ask your instructor or watch this program again.	____	____

(End of Job Sheet)

SKILL TEST RECORD

EVALUATOR'S COMMENTS

____

____

____

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Performance Evaluation Key.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:				
Lay out of runners and tees proper	4	3	2	1
Wire hangers installed	4	3	2	1
Ceiling height and center established properly	4	3	2	1
Cut and installed panels properly	4	3	2	1

EVALUATOR'S COMMENTS

____

____

____

AVERAGE RATING

Evaluator note: To obtain an average rating for the Competency Profile, total the designated points in "Product Evaluation" and divide by the total number of criteria. Circle the rating on the "Performance Evaluation Key" below.

PERFORMANCE EVALUATION KEY

4 **Skilled** – Can perform job with no additional training

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1 **Unskilled** – Is familiar with process, but is unable to perform job

WRITTEN TEST

APPLIED SKILLS A 3

Name ______________________________ Score __________

OBJECTIVE 1

Given a list of terms associated with applied skills for interior systems, match them to their definitions. Write the letter that corresponds to the most correct answer.

_____ 1. The place where the edges of two pieces of drywall meet is a

a. seam line
b. joint
c. layer
d. bead

_____ 2. To bond together two or more layers of material is to

a. laminate them
b. seal them
c. featheredge pairs
d. overlap pairs

_____ 3. Packaging used to protect and to provide a platform for transporting factory-built cabinets is a

a. skid
b. shim
c. bed layer
d. T-brace

_____ 4. The initial installation of electrical wires, plumbing, etc. is called the

a. pre-schedule
b. blocking phase
c. pre-phase
d. rough-in

May be photocopied for student use.

_____ 5. The amount of heat needed to raise the temperature of one pound of water one degree Fahrenheit is called a

a. r-factor
b. lineal heat
c. Btu
d. batt point

_____ 6. Spacing between the edge of a door and jamb or between the jamb and the trimmer stud is the

a. gap
b. opening
c. finish space
d. clearance

_____ 7. A one dimensional measurement is

a. square feet
b. lineal feet
c. board feet
d. cubic yard

_____ 8. The impression on a drywall surface formed by a nail being driven to its proper depth is a

a. dimple
b. joint
c. depression
d. both a and b are correct

_____ 9. Thin pieces of material used to adjust and fill a space between two members is a

a. expansion
b. shim
c. joint
d. laminate

May be photocopied for student use.

_____10. A brace used to hold drywall in place against the ceiling joist is a

a. shim
b. skid
c. foot lifter
d. T-brace

_____11. A listing that identifies the type, size, and location of doors for a given building is a

a. plot plan
b. swing table
c. rough-in plan
d. door schedule

_____12. The natural tendency of a system or material to enlarge because of heat and/or moisture is

a. contraction
b. Btu factor
c. expansion
d. compression

_____13. Openings that are made in drywall for convenience of access to other areas or for electrical outlets are called

a. joint openings
b. cutouts
c. blocking cuts
d. expansion slots

_____14. The hand or swing identifies the

a. the direction a door opens
b. the side of a jamb to which a door attaches
c. clearances for a door
d. both a and b are correct

May be photocopied for student use.

_____15. The process of embedding perforated tape into drywall joints

a. featheredging
b. blocking
c. bedding
d. rough-in

_____16. A term used to describe drywall fasteners being forced out of wall and ceiling framing is called

a. popping
b. springing
c. contracting
d. extraction

_____17. A wall opening framed to receive a finish component such as a door or window is called a

a. rough-in wall
b. void
c. rough opening
d. component frame

_____18. The use of 2× material placed in the wall to provide a firm anchor for such items as cabinets or sinks is called

a. bedding
b. blocking
c. back-strap
d. T-braces

_____19. To spread joint compound or topping so that it tapers to a thin layer is called a

a. thinning bed
b. featheredge
c. paper thin layer
d. blocking

May be photocopied for student use.

_____20. The ability of a material to resist a load force that tends to squeeze or shorten it is its

a. contraction factor
b. load stress tolerance
c. stress factor
d. compressive strength

OBJECTIVE 2

Select the word that correctly completes statements concerning the installation methods used to install insulation.

_____ 1. Blown-in insulation is the most common type used in _______________ of residential buildings.

a. ceilings
b. walls
c. perimeters
d. sills

_____ 2. A common method to hold batt insulation in place is to use

a. nails or screws
b. self-sealing tabs
c. drive pins
d. staples and/or adhesive

_____ 3. A strip of vapor barrier, placed around windows, can be secured using

a. adhesive
b. staples
c. nails or tacks
d. both a and b methods are used

_____ 4. For a slab-on-grade, the rigid insulation sheets should be positioned

a. above the vapor barrier
b. above the slab on-grade
c. below the vapor barrier
d. 4" below the fill material

May be photocopied for student use.

OBJECTIVE 3

Given incomplete statements, select the word or phrase that correctly complete guidelines for drywall installation.

_____ 1. When sanding drywall joints, you should wear

- a. goggles
- b. protective respirator/dust mask
- c. rubber gloves
- d. both a and b are correct

_____ 2. Inspect the facility to insure

- a. rough-in complete
- b. blocking installed
- c. electrical wiring is safely routed and protected
- d. all the above

_____ 3. Before starting a drywall installation, you must first

- a. decide if the job plans require the use of nails, screws, and/or adhesive as the method of application
- b. build "R" braces
- c. measure and cut openings for all outlets
- d. all the above

_____ 4. Cutouts in drywall for fixtures should be no more than

- a. twelve inches from the edge of the drywall
- b. ½ inch larger than the fixture
- c. ⅛ inch larger than the fixture
- d. 1/16 inch larger than the fixture

May be photocopied for student use.

_____ 5. The suggested tools for marking and cutting drywall are

a. 4-foot T-square and utility knife
b. framing square and a T-brace
c. a straightedge and keyhole saw
d. a chalk line and a tile knife

_____ 6. When a cutout is required, the distance for the opening should be marked on the _______________ of the drywall and cut out with a

a. back, keyhole saw
b. face, keyhole saw
c. face, utility knife
d. back, handsaw

_____ 7. The length of a T-brace should be

a. about 1" shorter than the floor-to-ceiling height
b. about 1" longer than the floor-to-ceiling height
c. 8 or 12 feet depending on the drywall size used
d. 8 feet plus the thickness of the drywall

_____ 8. When installing wallboard to sidewalls in a horizontal application, you should

a. install the lower board first
b. always use double nailing
c. install the top board first
[✓ d.] use a T-brace

_____ 9. A minimum of _______________ coats of joint compound is recommended for all taped drywall joints.

a. 1
b. 2
c. 3
d. 4

May be photocopied for student use.

_____10. To ensure proper drying time, joints must be allowed to dry _______________ hours before sanding.

a. 24
b. 30
c. 36
d. 48

_____11. The final application of joint compound should be _______________ to _______________ inches wide.

a. 10-12
b. 14-18
c. 16-20
d. 18-22

_____12. Before a drywall installation, while inspecting the facility,

a. be certain ceiling backing has been installed
b. ensure all building and fire codes have been or will be met
c. ensure electrical wiring is safely routed
d. all the above

_____13. The general guidelines for installing drywall state

a. always use 8′ drywall lengths on ceilings
b. cut openings no more than ½″ larger than fixtures
c. always apply drywall at right angles to ceiling joists
d. use drywall nails on walls and screws/adhesive for ceilings

_____14. Drywall installation guidelines state that

a. use a nail set to drive drywall fasteners below the paper surface
b. all edges should be supported by framing
c. metal corner bead should be nailed every 2-3 inches
d. drywall should never be applied vertically to side walls

May be photocopied for student use.

OBJECTIVE 4 **Choose the guidelines for planning the installation of interior doors.**

_____ 1. Door sizes are

a. standard and always the same width and height
b. always 3′0″ × 6′8″
c. always RH swings
d. specified in the door schedule

_____ 2. When planning the installation of a "RH" door, the hinges go on the _______________ and the door swings _______________ from you.

a. right, away
b. right, toward
c. left, away
d. left, toward

OBJECTIVE 5 **Name popular methods to install acoustical ceilings.**

_____ 1. The most popular method(s) to install acoustical ceilings is/are

a. suspension systems
b. cementing to a firm surface
c. using fasteners
d. all the above

_____ 2. A method to install acoustical ceiling that employs metal molding and cross members is the

a. suspension system method
b. cementing method
c. using fasteners method
d. overhead tile method

NOTE: Objectives 6-11 are evaluated on job sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

APPLIED SKILLS

A 3

OBJECTIVE 1

1. b
2. a
3. a
4. d
5. c
6. d
7. b
8. a
9. b
10. d
11. d
12. c
13. b
14. d
15. c
16. a
17. c
18. b
19. b
20. d

OBJECTIVE 2

1. a
2. d
3. d
4. c

OBJECTIVE 3

1. d
2. d
3. a
4. c
5. a
6. b
7. b
8. c
9. c
10. a
11. b
12. d
13. c
14. b

OBJECTIVE 4

1. d
2. a

OBJECTIVE 5

1. d
2. a

CIMC
TEST CODE SHEET

VOCATIONAL PROGRAM (BOOK TITLE) ***Introduction to Interior Systems***

UNIT NUMBER AND TITLE — A 3 Applied Skills

TOTAL NUMBER OF TEST QUESTIONS 42

TOTAL NUMBER OF BASIC SKILL QUESTIONS 0

OBJECTIVE NUMBER	TEST QUESTION NUMBER(S)	BASIC SKILL CODE(S)
1	1-20	X
2	1-4	X
3	1-14	X
4	1-2	X
5	1-2	X
6-11	Evaluated on JS	

INTRODUCTION TO INTERIOR SYSTEMS
COMPETENCY PROFILE

Student ______________________________ Soc. Sec. No. ____ – ____ – ____
Last First MI

PROGRAM ____________ Grade 9 10 11 12 Adult SCHOOL ____________

INSTRUCTOR ____________ SCHOOL ADDRESS ____________ PHONE ____________

STUDENT'S HOME ADDRESS ____________ DATE OF BIRTH ____________ PHONE ____________

STUDENT'S EMPLOYER ____________ ADDRESS ____________ PHONE ____________

CONTACT IN CASE OF EMERGENCY ____________ PHONE ____________

ADDRESS ____________

ADDRESS ____________ PHONE ____________

The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or to the general public.

ON-THE-JOB TRAINING/WORK EXPERIENCE

DURATION OF EMPLOYMENT	JOB TITLE	EMPLOYER	SUPERVISOR'S NAME	ADDRESS OF EMPLOYER	PHONE

This agency does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, qualified handicap, or disability.

Duplicate one copy for each student.

SPECIFIC JOB COMPETENCIES

DIRECTIONS: Evaluate the trainee using the rating scale below, and check the appropriate number to indicate the degree of competency. The numerical ratings of 4, 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below.

Rating Scale:
4 — **Skilled** — can perform job independently with no additional training.
3 — **Moderately Skilled** — has performed job independently during the training program; limited additional training may be required.
2 — **Limited Practice** — has practiced job during training program; additional training is required to develop skill.
1 — **Exposure Only** — general information provided with no practice time; close supervision needed and additional training required.
0 — **No Exposure** — no information or practice provided during training program; complete training required.

UNIT A1

Interior Systems Materials

4	3	2	1	0	
☐	☐	☐	☐	☐	1. Given a list of terms associated with interior systems materials, match them to their correct definitions.
☐	☐	☐	☐	☐	2. Given drawings, identify insulation types.
☐	☐	☐	☐	☐	3. Identify standard sizes and shapes of drywall.
☐	☐	☐	☐	☐	4. Name types and major characteristics of ceiling systems.
☐	☐	☐	☐	☐	5. Given alternatives, select the proper title of interior trim types.
☐	☐	☐	☐	☐	6. Provided drawings, match the correct titles of interior window and door parts.
☐	☐	☐	☐	☐	7. Name types of finish flooring and underlayment.
☐	☐	☐	☐	☐	8. Calculate the number of 4' x 8' sheets of underlayment needed to floor a room.
☐	☐	☐	☐	☐	9. Estimate the number of ceiling tiles needed to finish a ceiling.
☐	☐	☐	☐	☐	10. Calculate the material required to insulate a structure.
☐	☐	☐	☐	☐	11. Estimate materials needed to drywall a structure.
☐	☐	☐	☐	☐	12. Estimate materials needed to trim a room.
☐	☐	☐	☐	☐	13. Given a drawing, match the correct titles to parts of a cabinet.
☐	☐	☐	☐	☐	14. ______________________________

WRITTEN TEST SCORE ______________________________

UNIT A2

Interior Systems Tools

4	3	2	1	0	
☐	☐	☐	☐	☐	1. Given a list of terms associated with interior systems tools, match them to their correct definitions.
☐	☐	☐	☐	☐	2. From alternatives, choose the proper care and safety guidelines for the use of hand and power tools.
☐	☐	☐	☐	☐	3. Given drawings, identify hand tools used for the installation of interior systems.
☐	☐	☐	☐	☐	4. Given drawings, identify power tools used for the installation of interior systems.
☐	☐	☐	☐	☐	5. Use a hammer properly.
☐	☐	☐	☐	☐	6. Use a handsaw.
☐	☐	☐	☐	☐	7. Use a framing square and rule to lay out a corner.
☐	☐	☐	☐	☐	8. Use a level.
☐	☐	☐	☐	☐	9. Perform a ripping operation with a circular saw.
☐	☐	☐	☐	☐	10. Use a T-square and a utility knife to measure and cut drywall.
☐	☐	☐	☐	☐	11. ______________________________

WRITTEN TEST SCORE ______________________________

UNIT A3

Applied Skills

4	3	2	1	0	
☐	☐	☐	☐	☐	1. Given a list of terms associated with applied skills for interior systems, match them to their correct definitions.
☐	☐	☐	☐	☐	2. Select the word that correctly completes statements concerning the installation methods used to install insulation.
☐	☐	☐	☐	☐	3. Given incomplete statements, select the word or phrase that correctly completes guidelines for drywall installation.
☐	☐	☐	☐	☐	4. Choose the guidelines for planning the installation of interior doors.
☐	☐	☐	☐	☐	5. Name popular methods to install acoustical ceilings.
☐	☐	☐	☐	☐	6. Install blanket insulation with an integral vapor barrier in walls.
☐	☐	☐	☐	☐	7. Install drywall.
☐	☐	☐	☐	☐	8. Install a factory-built cabinet.
☐	☐	☐	☐	☐	9. Install underlayment.
☐	☐	☐	☐	☐	10. Erect a suspended ceiling system.
☐	☐	☐	☐	☐	11. ______________________________

WRITTEN TEST SCORE ______________________________

Use of This Document

Use of this document can be used to record information about the student and the skills mastered by the student. This information is useful in documenting student progress during the training program and to provide information about the student's qualifications to potential employers and for entry into advanced training programs. Instructors using AGC-CIMC instructional materials are authorized to reproduce this document as required for use in their training programs.

INTRODUCTION TO INTERIOR SYSTEMS

CIMC

READING SKILLS

UNITS OF INSTRUCTION	Reading Comprehension									Research and Reference								Functional Reading						Language		Composition						
	Gain factual information	Distinguish fact, opinion and inference	Recognize stereotyping and bias	Recognize propaganda	Analyze cause and effect	Draw conclusions	Make generalizations	React to written material	Apply word analysis techniques	Select useful resources	Locate resources	Find materials in library	Use standard references	Use in-book reference tools	Use audiovisual media	Use computer data base	Use magazines and newspapers	Interpret forms and records	Follow written instructions	Interpret graphics and symbols	Use content area vocabulary	Interpret abbreviations/acronyms	Read aloud	Use standard grammar and correct spelling, punctuation, and capitalization	State ideas clearly	Use complete sentences	Develop preliminary outline	Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays	Proofread and edit
Interior Systems Materials																				●												
Interior Systems Tools																			●		●											
Applied Skills													●						●	●												

CIMC BASIC SKILLS DOCUMENTATION

WRITING SKILLS

MATH SKILLS

Composition						Research					Functional Writing							Operation and Calculation														Math Application											Data Analysis and Display							
Use topic sentences	Use introductory/closing paragraphs	Compose reports	Compose essays	Proofread and edit	Construct graphics and symbols	Take notes	Use notecards	Create bibliography	Use footnotes	Outline material	Complete forms and records	Write instructions	Write letters	Write job applications	Write resumes	Use word processing	Use computer graphics	Round off numbers	Estimate answers	Use scientific notations	Use exponential notations	Calculate with whole numbers	Calculate with fractions	Calculate with decimals	Convert whole numbers to fractions	Convert whole numbers to decimals	Solve numerical expressions	Solve formulae and equations	Obtain squares and square roots	Convert units of measure	Perform metric calculations	Solve word problems	Select/apply mathematical formula	Select/apply mathematical procedure	Use English and metric measures	Solve time/rate/distance problems	Solve ratio/proportion problems	Solve percent problems	Apply techniques of scaling	Apply algebra principles	Apply geometry principles	Apply trigonometry principles	Interpret charts and tables	Interpret graphs (type)	Collect /record data	Apply sampling techniques	Apply principles of probability	Construct charts and tables	Construct graphs	Calculate statistics
																						●	●	●	●	●		●							●															
																																			●						●			●						
																																		●	●															

ON MATRIX

LS

SCIENCE SKILLS

ysis ay				Functional Math														General Science									Life Science							Physical Science					Earth Science							
Construct graphs	Calculate statistics	Interpret statistics	Interpret blueprints/plans	Make measurements	Perform banking transactions	Make change	Solve practical problems	Calculate gross earnings	Solve income/expense problems	Prepare a budget	Calculate interest	Solve interest problems	Calculate sales tax	Determine income tax	Use calculator for computation	Use computer for computation	Use computer spreadsheets	Apply computing skills	Apply scientific method of inquiry	Conduct experiments	Investigate science ethics	Investigate science history	Investigate/apply economics in technology	Use scientific instruments	Investigate/apply technology	Collect specimens	Identify/classify living organisms	Investigate biological history of the earth	Investigate food chains, webs, pyramids	Investigate/apply principles of human development	Investigate/apply principles of genetics/heredity	Investigate/apply principles of anatomy/physiology	Investigate health issues	Analyze/classify matter	Investigate forms/changes of matter	Investigate forms/changes of energy	Investigate/apply chemical properties	Investigate/apply physical laws	Investigate physical characteristics of the earth	Investigate geological history of the earth	Investigate physical forces acting on the earth	Solve problems of longitude, latitude, and time zones	Investigate conservation of physical resources	Investigate conservation of living resources	Investigate issues of environmental impact	Apply science principles to environmental issues
				●																				●																						
				●																				●																						

CIMC

ORAL COMMUNICATION SKILLS

IN

UNITS OF INSTRUCTION

UNITS OF INSTRUCTION	Oral Presentation								
	Make informative presentations	Make persuasive presentations	Present personal opinion/viewpoint	Use good speaking techniques	Select/use words effectively	Use effective body language	Present appropriate appearance	Integrate audio and/or visual materials in oral presentations	Adapt presentation to specific audience
Interior Systems Materials									
Interior Systems Tools									
Applied Skills									
*									

UNITS OF INSTRUCTION	Listening			
	Apply active listening skills	Distinguish fact, opinion, and inference	Draw conclusions/make generalizations	Analyze/identify point of view
Interior Systems Materials				
Interior Systems Tools				
Applied Skills				
*				

UNITS OF INSTRUCTION	Interactive Communication									
	Give/follow oral directions	Apply questioning techniques	Conduct/receive interviews	Analyze/apply nonverbal communication	Work effectively in a group	Communicate with clients/customers/patients	Communicate with co-workers	Communicate with supervisors	Communicate with professional colleagues/associates	Apply telephone etiquette
Interior Systems Materials										
Interior Systems Tools										
Applied Skills										
*										

UNITS OF INSTRUCTION	General Relating											
	Investigate/apply communication process models	Analyze/apply nonverbal communication	Investigate/apply cross-cultural communication	Interact with co-workers	Interact with supervisors	Interact with clients/customers/patients	Interact with professionalcolleagues/associates	Interact with family/friends	Participate in group activities	Participate in industrial relations/functions	Identify personal values/attitudes	Apply information to life
Interior Systems Materials												
Interior Systems Tools												
Applied Skills												
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* Use this line for entering your state or local codes for graduation requirements or learner outcomes.

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Developer of the Nation's Bes

NTERPERSONAL OR RELATING SKILLS

CREATIVE THINKING/ PROBLEM SOLVING SKILLS

Teamwork Cooperation																Leadership Influence							Cognitive Activities																				Job Se Selec		
Apply information to life experiences	Identify values/attitudes	Identify needs/drives	Select/apply appropriate behavior	Investigate/identify personal styles	Investigate/identify group/corporate climate	Give/receive feedback	Identify hidden purposes	Investigate/apply group dynamics	Control undesirable/inappropriate behavior	Resolve conflicts	Clarify goals/objectives	Devise "win/win" situations	Build consensus	Generate ideas	Present point of view	Analyze/apply leadership styles	Analyze/apply management styles	Obtain confidence of others	Develop esteem in self/others	Persuade others	Analyze/apply motivation techniques	Provide positive coaching	Collect/record information	Identify critical elements/issues	Define a problem	Identify underlying causes	Apply a problem-solving model	Analyze/synthesize information	Identify/analyze underlying assumptions	Draw conclusions	Predict results/outcomes	Identify/evaluate consequences	Identify/develop alternatives	Evaluate alternatives	Select an alternative	Devise a solution	Create a finished product	Apply intuitive/creative thinking processes	Transfer knowledge/training to new situations	Apply new technology	Develop an action plan	Evaluate results/outcomes	Analyze personal occupational aptitudes/preferences	Investigate employment prospects of a career field/occupation	Investigate training requirements for a career field/occupation

EMPLOYABILITY SKILLS

SOCIAL STUDIES SKILLS

b Search Selection						Job Aquisition Development														Information Analysis						Social Studies Application										Functional Social Studies														
Investigate training requirements for a career field/occupation	Investigate benefits of a career field/occupation	Compare/evaluate career options	Develop personal career path	Locate appropriate jobs	Analyze duties/requirements/benefits of specific job	Master specific job task/procedure	Fill in job-related applications	Write letter of application	Write personal resume	Interview for a job	Apply business etiquette	Practice good work habits/attitudes	Develop good personal presentation	Develop self-confidence/esteem	Develop effective leadership	Deal effectively with supervisors	Deal effectively with co-workers	Deal effectively with professional colleagues/associates	Deal effectively with customers/clients	Collect/record data	Interpret graphical information	Construct graphical information	Interpret maps/globes	Interpret statistical information	Analyze/interpret demographic information	Investigate/apply U.S. history	Investigate/apply world history	Investigate/apply U.S. geography	Investigate/apply world geography	Investigate/apply principles of government/politics	Investigate/apply principles of economics	Investigate/apply principles of ethics	Investigate/apply principles of psychology	Investigate/apply principles of sociology	Investigate/apply cross-cultural studies	Practice responsible personal economics	Prepare a personal budget	Use credit responsibly	Practice good work ethics	Participate in industrial relations	Interact with people of different races/cultures	Investigate/participate in government	Investigate/apply American legal practices	Select/use sources of information on current events	Analyze current events	Analyze consumer issues	Analyze social issues	Analyze conservation/ecology issues	Analyze social impact of science/technology	Analyze economic impact of science/technology
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